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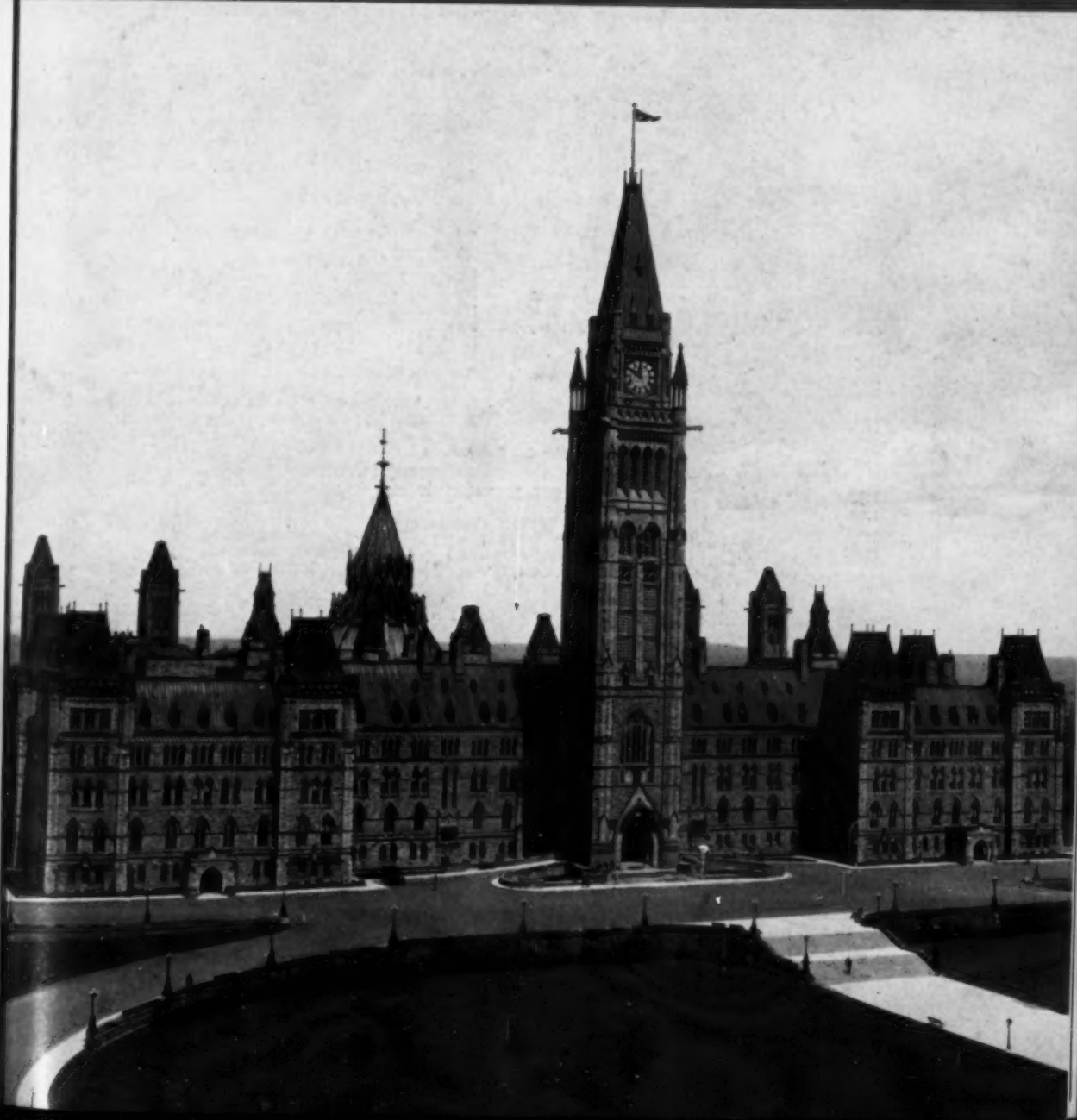
CANADIAN GEOGRAPHICAL JOURNAL

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Vol. XXXI • No. 3

SEPTEMBER 1945

PRICE 35¢





THE CANADIAN GEOGRAPHICAL SOCIETY

OTTAWA, CANADA



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CANADIAN GEOGRAPHICAL JOURNAL

Published monthly by
THE CANADIAN GEOGRAPHICAL SOCIETY
49 Metcalfe Street, Ottawa

Editor - GORDON M. DALLYN

This magazine is dedicated to the interpretation, in authentic and popular form, with extensive illustrations, of geography in its widest sense, first of Canada, then of the rest of the British Commonwealth and other parts of the world in which Canada has special interest.

The articles in this Journal are indexed in the *Reader's Guide to Periodical Literature* and the *Canadian Periodical Index* which may be found in any public library.

The British standard of spelling is adopted substantially as used by the Dominion Government and taught in most Canadian schools, the precise authority being the Oxford Dictionary as edited in 1936.

Address all communications regarding change of address, non-delivery of Journal, etc., to the publication office, 1,000 St. Antoine St., Montreal, Canada, giving old and new address. On all new memberships, the expiry date will be printed on wrapper containing starting number. This will constitute a receipt for subscription.

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CONTENTS

SEPTEMBER, 1945 + VOLUME XXXI + NUMBER 3

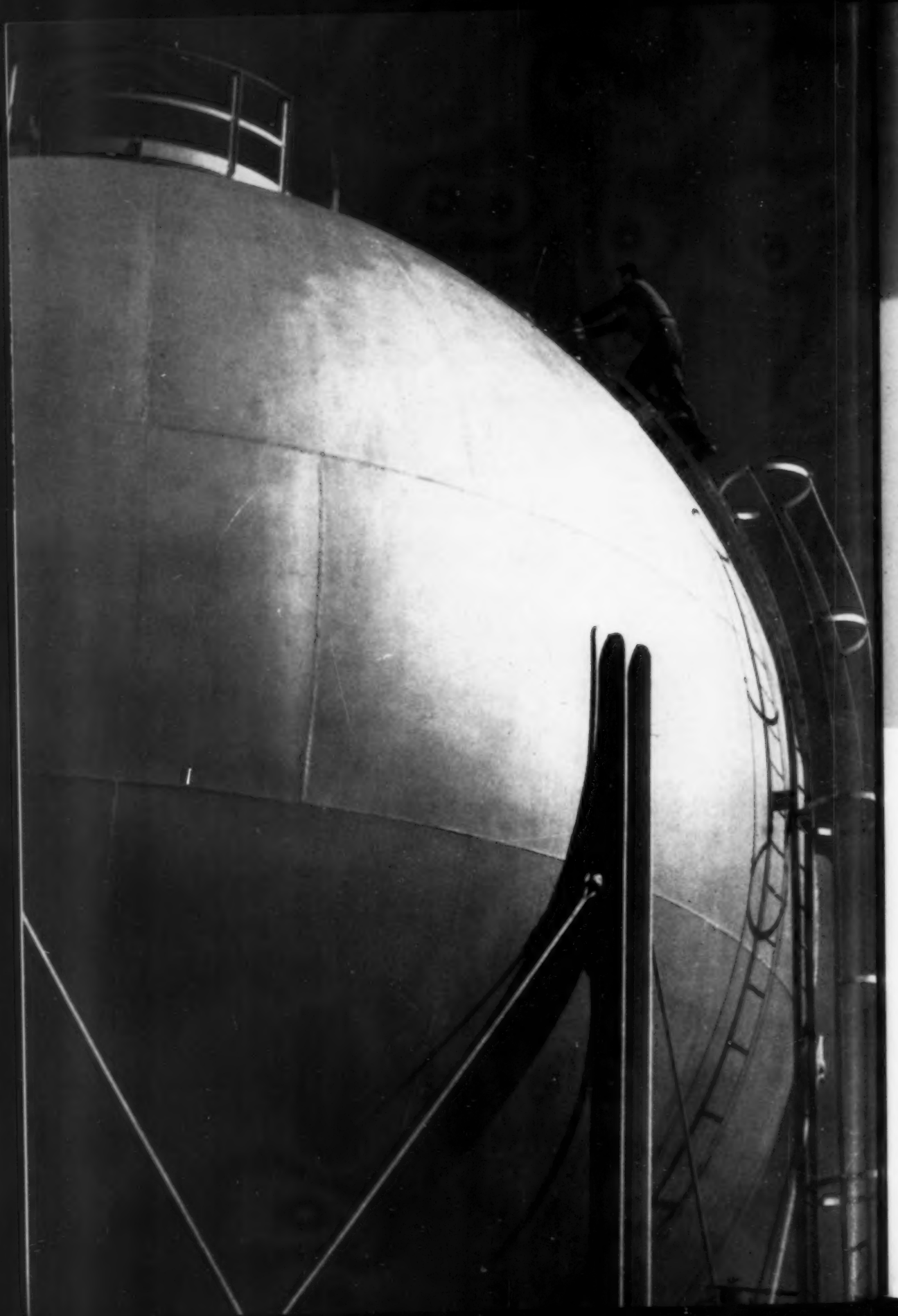
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	Page
CANADA'S NITROGEN INDUSTRY.....	106
by S. R. FROST	
MONUMENTS MARK THIS BOUNDARY....	120
by KATHLEEN WEEKS	
JOHN CANUCK APPLIES FOR DEPENDENTS' ALLOWANCE.....	134
by W/C H.T.I. LEE and S/L BASIL DEAN	
ENGLAND'S OLD COUNTRY MARKETS....	148
EDITOR'S NOTE-BOOK.....	IX
AMONGST THE NEW BOOKS.....	IX

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PRINTED IN CANADA





Canada's Nitrogen Industry

by S. R. FROST

IN MEETING THE DEMANDS of modern warfare in the Allied cause, the achievements of Canadian industries have indeed been noteworthy. Our chemical industry has played an important part in this wartime industrial expansion, and in no branch of chemical industry has the progress been more notable than in the production of compounds of nitrogen.

Nitrogen is one of the sinews of war. It is the basic element of all modern explosives, and, without explosives, military warfare would have to revert to the medieval methods of the sword, the lance, and the bow. The war of 1914-18 was not begun

until after Haber had perfected for Germany his method of fixing nitrogen by direct synthesis with hydrogen, making Germany independent of the natural nitrates of Chile. To meet the demands of war, Germany, before World War II, had increased her nitrogen production many times and perfected methods of making artificial rubber, gasoline and oil. It is an interesting sidelight on the relation between nitrogen and military power to consider that the two countries of the world with the largest synthetic nitrogen capacity in pre-war days were Germany and Japan with estimated annual capacities of 1,300,000 tons and 400,000 tons respectively.

At top:—Granular cyanamid (21 per cent nitrogen). Fertilizers in granular form are preferred for most purposes.

Left:—Ammonia sphere with storage capacity of one million pounds of anhydrous ammonia—Welland Chemical Works Limited

There have been many schemes suggested whereby the war-like proclivities of Germany and Japan may be brought under control, so that a lasting peace will be insured and a favourable environment provided for encouraging the development of humanitarian principles in international relations. One of the suggestions has been the removal of all nitrogen fixation facilities from Central Europe, and the feeding back to that area of sufficient nitrogen only to supply agricultural requirements and other essential uses. Obviously, discussion of such matters is outside the scope of this article, but the importance of nitrogen as a war material is indicated.

Nitrogen, as it exists in the air, is one of the most innocuous elements. There is no lack of it as air contains 75 per cent of nitrogen by weight, and the supply above each acre of the earth's surface is estimated at 34,000 tons. When this inert gas is "fixed" and chemically combined with oxygen and other elements to form a solid,

and the solid so formed is exploded, it is almost instantly reconverted to its original gaseous forms, so that the volume occupied is increased more than 1,000 times. Accompanying this increase in volume is the almost instantaneous liberation of immense quantities of energy by disruption of the nitrogen-oxygen linkage, the formation of molecules of nitrogen and the union of oxygen with carbon and hydrogen. It is this increase in volume and release of energy that propels the bullets and shells, and causes the devastating effects of the bomb and torpedo.

There are a number of explosive compounds that can be made without nitrogen, but for all practical purposes, nitrogen is the common base for all modern military explosives. The more atoms of nitrogen the chemist can work into his explosive formula the more effective it becomes. Nitro-cellulose, nitro-glycerine, tri-nitro-toluol, guanidine nitrate, and picric acid are all formulated from nitric acid.

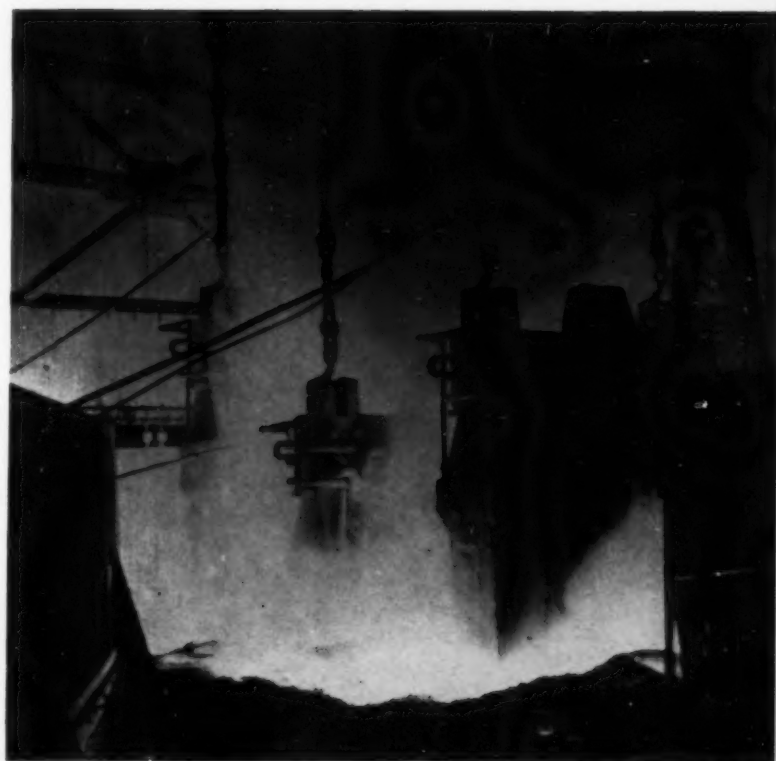
Nitrogen is rather a Dr. Jekyll and Mr. Hyde sort of element; while destructive in warfare, it has a peacetime role much more useful and pleasant. It is the "growth" element without which plants cannot thrive. Like the "Ancient Mariner" with "water, water, everywhere, nor any drop to drink", the plant, though surrounded by an atmosphere of nitrogen, cannot use it. The exception to this rule is the clover family, the plants of which may, under favourable conditions, and by inoculation of the seed or the soil with certain bacteria, absorb some of the inert nitrogen of their environment. Hence the high regard the farmer has for soil improving clovers and other legumes. In most farming practice, it is necessary to supplement this natural source of nitrogen and the nitrogen in barnyard manure with "chemical" nitrogen. The potato grower of the Maritimes will customarily use 40 pounds of nitrogen (equivalent to 200 pounds of sulphate of ammonia) on each acre to ensure a satisfactory crop growth.

Automatic gas analysis apparatus helps in controlling complicated reactions at the Alberta Nitrogen Products plant, Calgary, Alberta.

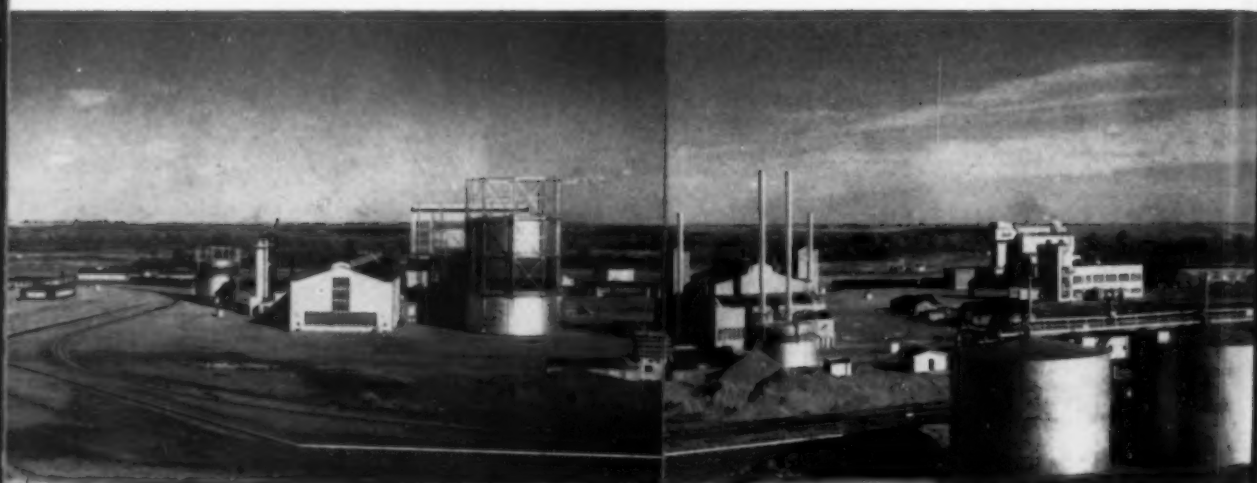




Above:—Nitrogen-fixation ovens where carbide and nitrogen are chemically combined—at the plant of North American Cyanamid Limited, Niagara Falls, Ontario.



Right:—The electric arc furnace for making calcium carbide — at North American Cyanamid Limited.



General view of plant—Alberta Nitrogen Products Limited

A similar quantity applied to hay-land will, under favourable conditions, permit an increase in yield of one ton of hay per acre. In this latter case the chemical processes of the plant convert inorganic or "chemical" nitrogen into complex organic nitrogen derivatives known as proteins. To pursue the analogy, just as the chemical nitrogen added by the farmer is the growth element for the plant, so the edible nitrogen compounds so produced contain the growth and energy elements of feeding stuffs for the farmer's herd and finally reach our table as high protein foods such as roast beef and porterhouse steak.

In the pioneering years when the farmers tilled a soil rich in accumulated humus and fertility, there was little need for chemical nitrogen or other artificial fertilizers. After one hundred or two hundred years of continuous cropping, soil deficiencies became manifest. Phosphorous and lime have to be added, then later comes the demand for nitrogen and potash. (Some of our virgin soils such as the conifer growing areas of Northern Ontario respond to fertilizer right from the start.) Everywhere in Canada, however, with the possible exception of some prairie soils, the pioneering era is over, and most of our farmers have learned to rely on the application of commercial

fertilizers to supplement crop residues, barnyard manure, and to meet soil deficiencies and increase crop production. Consequently, the demand for fertilizers grew in Canada even through the great agricultural depression of 1930-1937. When Canada was called upon to fulfil the demands for foodstuffs as a result of the present war, and the shortage of labour (fortunately in most cases) prevented the bringing of marginal land under the plow, the Canadian farmer grasped this new method of crop production, and the use of fertilizers grew rapidly. To those of us who have realized the devastating inroads made on our mineral resources and timber lands by reason of the insatiable demands of war, it is comforting to remember that in our arable soils we have a national asset which has come through the war not only unimpaired, but, in the opinion of many authorities, actually improved. This is due not only to the increased use of commercial plant foods but also to our restricted exports of grain and our much enlarged production of live stock.

The use of fertilizers in agriculture was known to the ancients. The early Indian of the Atlantic Coast area, when planting his maize, placed a fish under the seed as an offering to his gods to induce them to give

the increase. Similarly, the use of wood ashes, chalk, guano, bones, and other packing-house products has been customary for generations. The merit of modern scientific fertilizer practice is not that it discovered new methods of soil-enrichment, but rather that it expanded them.

The nitrate beds of Chile were developed in 1868, and for many decades were the principal source of the world's nitrogen supply. In 1898, thirty years after their discovery, Sir William Crookes, the noted British scientist, called attention to the fact that the Chilean supply was a wasting asset and that unless additional sources could be discovered, world starvation was inevitable. Fortunately, science found the answer. In the same year that Sir William made his doleful prediction, two chemists, Frank and Caro, experimenting in Italy, found that nitrogen gas could be made to combine with calcium carbide. This was the beginning of the cyanamide process, but it was not until 1906 that the first plant was built, and, in the meantime, Birkeland and Eyde of Norway found that, in the electric arc, nitrogen and oxygen could be made to unite to form nitric oxide, and, by further oxidation and absorption, nitric acid and calcium nitrate were produced. This process has now been superseded by the synthetic

ammonia method. Haber in Germany discovered this method of getting nitrogen to combine with hydrogen to form the well known gas—ammonia. The Haber-Bosch process, as it is now called (Bosch being the engineer who made the process practicable on a large scale) has had many subsequent improvements and modifications—there being now some nine recognized processes for the synthetic production of ammonia from nitrogen and hydrogen.

Canada's nitrogen industry began in 1908 when an American engineer, the late Frank Washburn, Sr., returned from a European trip with the rights to manufacture in America the product known as calcium cyanamide. The low cost power then available at Niagara Falls, Ontario, was the lure that drew Mr. Washburn to Canada, and cheap power or cheap fuel still remains the *sine qua non* of nitrogen fixation. The original plant was built in 1909. It was small, with only 5,000 tons per year capacity and based on European practice of low-cost labour. Subsequent additions and improvements have brought the capacity up to 300,000 tons of cyanamide per annum,* and, at the same time, hand labour was eliminated and efficiencies stepped up. Under the engineering skill of K.F. Cooper, and later the management of the late George E. Cox

*The manufacture of cyanamide may be divided into five series of operations: the preparation of the raw materials, lime and coke; the manufacture of calcium carbide in the electric furnace and its subsequent treatment; the separation of nitrogen from liquid air; the nitrification of powdered carbide, and the final preparation of the product for the market. Each of these operations is on a large scale and embodies modern chemical engineering practices.

Limestone of high purity, from the Company-owned quarry at Beechville, Ontario, is burned into lime in a plant equipped with seven large rotary lime kilns. The burning is done with powdered coal for fuel, and each kiln has a capacity of 100 tons of lime per day. Coke is carefully crushed and dried, and mixed with the burned lime in approximately the proportions of 60 pounds lime to 40 pounds of coke.

This mixture is then fed into huge electric furnaces, the larger ones requiring 30,000 electrical horse-power, and, in these furnaces under the intense heat, molten carbide is formed and tapped off into continuous conveyors. When cooled, the carbide is crushed, then pulverized, and then placed in large ovens lined with fire-brick, which are then sealed. Nitrogen gas prepared from liquid air is forced into these ovens, and the reaction is started by inserting for a short time in the centre of the oven, a carbon rod heated to incandescence

electrically. By radiation, the surrounding charge of carbide becomes very hot, and, at this temperature, readily absorbs the nitrogen gas forming calcium cyanamide and carbon.

Nitrogen is obtained by the Claude process of fractional distillation of liquid air. In this process advantage is taken of the fact that oxygen boils off from liquid air at a slightly higher temperature (13° centigrade) than nitrogen, and the two elements are thus separated providing a relatively inexpensive source of nitrogen from the atmosphere. Air is an essential raw material in all nitrogen plants; Cyanamid uses several hundred tons of it every day.

When the reaction in the nitrogen oven is complete, the cover is removed and the semi-fused mass containing about 23 per cent nitrogen allowed to cool somewhat. It is then removed from the oven by an ingenious device, crushed and pulverized. The product is treated in various ways, depending on its use. If for direct application fertilizer, it is granulated in small granules, packed in heavy moisture-proof paper sacks; or, if to be used as an ingredient in mixed fertilizer, it is mixed with water to remove traces of carbide, and then oiled to eliminate dustiness. For the manufacture of chemicals the product is usually shipped with a minimum of treatment in large covered hopper cars.



Checking temperature of 2,500 h.p. synchronous motor driving compressor—Calgary, Alberta.

and his staff, the Canadian plant, North American Cyanamid Limited, grew to be the largest plant of its kind in the world, and one of the most efficient.

Crude cyanamide is readily converted into ammonia, but on account of the large demands of the cyanamide process for power, as well as lime and coke, ammonia

may be made more cheaply by the Haber process or one of its modifications. The cyanamide process has, however, certain distinct advantages. The final product is adaptable with practically no further treatment for agriculture; it contains a large percentage of lime badly needed in acid soils; and further cyanamide is a "parent" chemical and in increasing demand for the production of various compounds of nitrogen such as cyanide, guanidine, urea, and dicyandiamide, all of which have become of great importance.

While Cyanamid was expanding in the East, there was a corresponding and important development proceeding in the western part of Canada at Trail, B. C. The Consolidated Mining & Smelting Co., formed in 1906 to develop base metals in south British Columbia, embarked in 1930 on a nitrogen and fertilizer programme. The main reason for this was because of the high sulphur content of the ore from the Sullivan Mines at Kimberley being treated at the Trail smelter. In normal operations this sulphur, which constituted more than one-quarter of the total weight of the ore, was evolved as a gas known as sulphur dioxide, and, in spite of its being diluted with air and the use of stacks to assist in its dissipation, some damage to vegetation was experienced.

Consolidated therefore decided that this valuable by-product should be reclaimed

Gas flues—Alberta Nitrogen Products Limited



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in the form of sulphuric acid, and a programme was developed of considerable importance to Canada whereby the acid so obtained was used in the manufacture of soluble phosphate fertilizers. Undoubtedly the Company had in mind the day in the future when the great arable areas of our western plains would require substantial amounts of plant food. In order to make a fertilizer containing nitrogen as well as phosphate, the Company entered the nitrogen field using the Fauser process of making ammonia by direct combination of nitrogen and hydrogen. The nitrogen was obtained from liquid air in exactly the same manner as Cyanamid used, but production of hydrogen was more costly and difficult. Low-cost electric power was brought into the picture as Consolidated had already been forced to develop a large amount of power on the Kootenay River for its metal smelting and refining operations. Part of

this low-cost power was turned over to the new chemical plant for the manufacture of hydrogen by the electrolytic process.**

In the same year (1930) C-I-L completed their installation of equipment at their Sandwich, Ontario, plant for making ammonia from by-product hydrogen derived from caustic soda production.

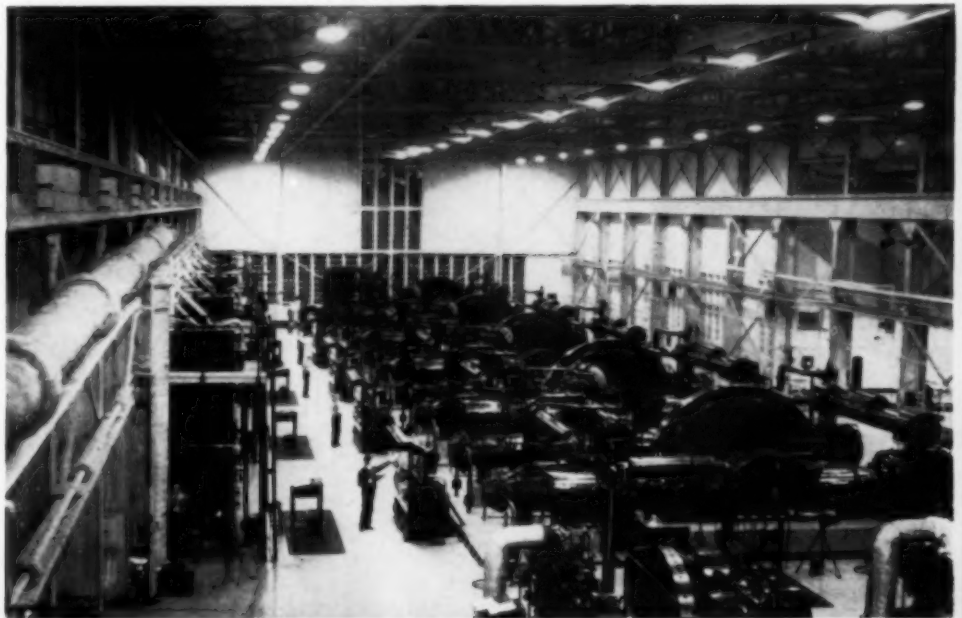
This then was the situation at the outbreak of the present war, and up to the early part of 1940. The total annual capacity in Canada was about 110,000 tons of synthetic nitrogen, plus about 10,000 tons of by-product nitrogen from the manufacture of coke. About ninety per cent of the total production was exported. With this output, Canada ranked ninth in world production. In the spring of 1940, Great Britain, whose own sources of nitrogen were within bombing range of the Luftwaffe, requested Canada to create a reserve supply of nitrogen, mainly in the form of ammonium nitrate. For a

**In this process, electrolytic cells of a special design perfected by the Company are kept filled with distilled water containing caustic potash or soda in solution. Direct electric current is led to the electrodes of these cells, and the two gases, hydrogen and oxygen, are given off by the decomposition of the water. As air is the raw material for the manufacture of nitrogen, and hydrogen is derived from water, these two common elements, air and water, are the raw materials used at Trail for the making of ammonia. Three parts of hydrogen are mixed with one part of nitrogen and compressed to about 3,500 pounds per square inch, and passed through a catalyst at a temperature of 450 degrees centigrade. Under this temperature and pressure a portion of the gases is combined to form ammonia which is removed while the remainder of the mixed gas is circulated with fresh gases so that in the

cycle a pre-war production of well over 100 tons of ammonia per day is obtained. Usually the ammonia so produced is stored as "anhydrous" ammonia, pure liquid ammonia containing no water.

To convert this ammonia base into a solid or usable form of fertilizer, it must be neutralized or absorbed by an acid. When sulphuric acid is used the end product is sulphate of ammonia, a white salt well known in the fertilizer trade. It was found desirable at Trail to absorb it in phosphoric acid also, as phosphates are most necessary in fertilizers. Raw phosphate rock from the Company's own mines across the border was brought to the plant, finely ground, treated with sulphuric acid, and the resultant phosphoric acid filtered from the by-product calcium sulphate, and then neutralized with ammonia to make ammonium phosphate.

Compressor plant where the nitrogen-hydrogen mixture is compressed to 5,000 pounds per square inch—Alberta Nitrogen Products Limited.





time, ammonia was available for this from the United States and the above mentioned production at Trail, but it soon became evident that to complete her programme Canada should increase her synthetic nitrogen production and four projects were undertaken.

In the first project at Trail, sufficient additions were made to the electrolytic hydrogen plant and other equipment to step up the output by another 50 tons of ammonia per day. Then also at Trail additional ammonia was manufactured in a new plant using the coke-ammonia process***, with compressors, nitric acid

***In this process, hydrogen and nitrogen are produced from coke, using standard water gas and producer gas generators. Water gas is substantially hydrogen, and is obtained by blowing air (oxygen enriched at Trail) and water vapour through an incandescent coke bed; in the nitrogen producers, the burning of coke is regulated to produce a gas which is substantially nitrogen. Both the producer gas and the water gas contain relatively high carbon monoxide impurities. The two gases are mixed in such a proportion that the hydrogen plus the carbon monoxide is three times the nitrogen in the mixed gas. The carbon monoxide is then oxidized so that an equivalent volume of hydrogen is produced in somewhat the same fashion as described in the steam-methane process.

Water-cooling towers at Welland Chemical Works Limited

*General view of the
Welland Chemical
Works Limited, near
Niagara Falls, Ontario*



*Below:—Welland
Chemical Works
during construction
by the Chemical
Construction Com-
pany*

converters, and ancillary equipment to make 250 tons of ammonium nitrate per day.

Calgary was selected as the site of the third development by reason of a bountiful supply of natural gas rich in hydrogen, with good facilities such as power, labour, water, etc. The steam-methane method**** of making hydrogen, developed in Great Britain by Imperial Chemical Industries, was used, and a plant built with a capacity of 230 tons of ammonia and 140 tons of ammonium nitrate per day. This plant (Alberta Nitrogen Products Ltd.) at Calgary might be popularly described as a chemical engineer's dream come true.

The only raw materials are natural gas and water. Unlike most "dreams", this



****At Calgary, hydrogen is produced by the inter-action of natural gas and steam in the presence of a suitable catalyst. In the basic chemical reaction, methane reacts with water vapour to produce carbon monoxide and hydrogen. Sulphur is carefully removed from the natural gas; steam is mixed with the purified gas, and the mixture passes through Reform furnaces; where, in the presence of a catalyst, and at 750° C., a gas consisting of 75 per cent hydrogen and 13 per cent carbon monoxide is produced. The gas temperature is lowered by heat exchangers, and more steam is added. The carbon monoxide is oxidized to equivalent hydrogen

at 400°C. in the presence of a second catalyst, according to the equation $H_2O + CO = CO_2 + H_2$. The final composition of the gas includes only 3 per cent carbon monoxide, 20 per cent carbon dioxide.

At Calgary, methane is also used to burn the oxygen from air in order to make nitrogen. In three nitrogen generators, purified natural gas is mixed with air in a commercial carburettor, burned in a brick-lined, water-cooled combustion chamber. The gas produced is 85 per cent nitrogen, 11 per cent carbon dioxide; when mixed with the Reform gas, a suitable converted gas is available to provide the correct hydrogen-nitrogen ratios for ammonia synthesis.

plant has probably the lowest operating cost per ton of finished product of any known nitrogen plant.

Finally, near Niagara Falls, Ontario, the fourth and one of the largest plants was erected. Here the basic products were to be organic explosive nitrates, but essential intermediate materials were sulphuric acid, ammonia, and ammonium nitrate. A coke-ammonia plant was installed large enough to furnish hydrogen and nitrogen for a daily capacity of 120 tons of ammonia and from this to manufacture 250 tons of ammonium nitrate.

War is an extravagant jade, and no expense was spared. The best engineering skill of Canada, United States and Great Britain was available for the construction of these plants. Their total cost to the people of Canada approximates \$30,000,000. The speed with which these large plants were erected was remarkable even under war conditions. At the site of the Niagara plant (Welland Chemical Works Limited), the farmer-owner of the site was, in July, 1940, taking off his crop of alfalfa hay. Behind his mower an engineering party was running lines and driving stakes. By April, 1941, a fifteen million dollar plant stood on the site, a great part of which was in continuous operation.

Thus, by 1941, Canada's synthetic nitrogen capacity had been increased more than twice, or almost equal to that of the United States before the outbreak of the war. With such a capacity, even the extraordinary demands by the Allies for explosive nitrates were taken care of. Furthermore, the main British plant was not put out of commission, but its output was maintained, so that, in 1942, the problem of production was changed to a problem of disposal. While there was an over-supply of nitrogen for explosives, the quickened tempo of agriculture had caused a serious world shortage in nitrogen for the soil. The problem, therefore, was to adapt the ammonium nitrate production of explosive plants so that it could be used in agriculture. As originally made for explosives, ammonium nitrate was a

material which absorbed water from the air very much like calcium chloride which is used for keeping roads and driveways dust-free. Upon arrival at the fertilizer mixing plant, the ammonium nitrate was usually found to be in such a solid form that the original 100 pound bags shipped to these manufacturers were promptly christened "tomb stones". Co-operating with Canadian authorities in the efforts to improve the product, was the United States Department of Agriculture, and a research programme was immediately begun to determine methods of preparing ammonium nitrate so that it would be reasonably acceptable to agriculture as a fertilizer.

Ammonium nitrate had previously been used successfully for a number of years in a diluted form known as calnitro, in which the usual 35 per cent content of nitrogen had been diluted to about 20 per cent, by the addition of limestone. Similarly, coke nitro-chalk was a well and favourably known material in Great Britain, containing 15½ per cent nitrogen. Neither of these was acceptable to the authorities because it involved the movement of large quantities of inert material when freight space and equipment were at a premium. At all three Canadian ammonium nitrate plants, experiments were undertaken, the most successful of which was based on the original experiment by a chemist at the Calgary plant, who thought that, by allowing a concentrated solution of ammonium nitrate to drop through the air, there was a possibility of securing the proper shaped particle of ammonium nitrate. Using a tomato can with the bottom perforated, this young man poured ammonium nitrate solution from the top of a four-story building in the Calgary plant, and to his intense gratification, discovered that the particles that fell to the floor were white rounded beads looking like tapioca. This process, known as "prilling", was rapidly adopted, first at Calgary, then by the other Canadian Government plants. By using a special material to keep these rounded particles from sticking to each other, and by packing

CANADA'S NITROGEN INDUSTRY



General view of fertilizer and chemical plant at Warfield, British Columbia—Consolidated Mining and Smelting Company Limited

CANADA'S CHEMICAL NITROGEN INDUSTRY

	12 MONTHS ENDING JUNE 30, 1945		
	Tons Material	Tons Nitrogen	Approx. Value \$
I—PRODUCTION			
Basic Nitrogen Products including—Ammon. Sulphate, Ammon. Nitrate, Cyanamide and Ammon. Phosphates . . .	876,946	219,100	34,000,000
II—IMPORTS			
Nitrate of Soda Nitrogen Solutions Miscellaneous.	10,490	1,834	490,000
III—USED IN CANADA			
For Fertilizer	114,820	23,097	4,050,000
For Explosives*	107,000	40,520	4,835,000
For Chemicals and Misc.	10,200	3,604	740,000
IV—EXPORTED			
Basic Nitrogen Products and Derivatives for Fertilizers, Chemicals, Mining and other uses	706,641	161,850	31,900,000

*Considerable quantities exported after processing in Canada—not included in (IV).

the material in waterproof bags, a very high-grade fertilizer known as nitraprills, containing about 33 per cent nitrogen, was marketed and met with a most instantaneous favour. It is expected that, during the present year, Canada will manufacture well over 200,000 tons of this product.

In pre-war days trade sales of nitrogenous fertilizer were almost entirely under the control of cartels who divided the world market and set prices. With the coming of war, these agreements by corporations operating in world trade were ruled out, and a fertilizer committee of the Combined Food Board and Combined Raw Materials Board took over the allocation internationally among the allied and neutral nations of all fertilizer materials. On this committee, United States, Great Britain and Canada are represented, and sometimes other countries are invited to send a representative. "The general purpose of the Combined Food Board is to provide a common forum in which member nations may discuss jointly problems of mutual concern and to develop mutually accepted recommendations respecting allocation, production, procurement and international distribution of available supplies (in this case fertilizer materials) for purchase to their respective Governments. Its purpose is not to assume authority of operating responsibility, but to provide, to authorities and operating officials of member Governments, programmes with respect to which all possible international differences of opinion have been reconciled."

In other words, in this case the fertilizer committee of the Combined Boards acts as a benign cartel, and it is interesting to speculate to what extent this system of international allocation of available materials may survive in our post-war world. Cartels sometimes seem to be necessary, but most of us are agreed that the application of cartel control by private interests should not be tolerated in the future when it runs counter-current to international goodwill, and when it is operated for purposes of selfish aggrandizement.

Undoubtedly, the future picture of Canada's nitrogen industry will have to be part of a world picture. The suggestion that the Canadian nitrogen plants be retained and operated by the Government of Canada in order that the Canadian farmer may have cheap fertilizer does not indicate a thorough understanding of the situation. Up to the present, the Canadian farmer has not used a great deal of nitrogen, the largest consumption being for the last fertilizer year ending June, 1944, which was, in round figures, 20,000 tons of nitrogen, as well as 70,000 tons of phosphoric acid (P_2O_5), and 40,000 tons of potash (K_2O). If the Canadian plants were operating up to their capacity for the production of ammonium nitrate, they would make in one month all that Canada is in a position to use, and unless constant operation was provided for by exports, the cost to the Canadian farmer or to the people of Canada would be more, rather than less, than the pre-war cost of competitive nitrogen materials. Hence the necessity for planning the post-war programme on a basis of international trade, rather than the limited use of the product by the Canadian farmer, desirable as it is to provide our farmers with low-cost fertilizer. What is needed is an arrangement whereby the plants will be operated so that the following objectives will be attained:

- (a) The maintenance of the properties so that defence requirements will be protected.
- (b) Operation of the plant to the limit of the market to provide work for Canadians.
- (c) The assurance to the Canadian farmers of nitrogen at reasonable prices.

During the war, nearly all the combatant countries increased their production of nitrogen. Many European factories have been found relatively intact, but at the moment lack of coal (current production only 10 per cent of normal) is limiting nitrogen production in Northwestern Europe and causing a severe shortage. This condition, although it may continue for some time, can only be considered tem-

porary, as capacity there far exceeds normal demand. Export trade therefore faces a prospect which cannot in any sense be called bright. There are, however, a number of factors which should be kept in mind: the world will use some two million tons or more of chemical nitrogen which must be supplied from some source, and it is to be expected that the supplier who can deliver material of desirable quality, and at the right price, will get some business. There are new markets which can be developed, and, generally speaking, we can look for a rising consumption curve for many years.

Canada's position and reputation as a trading nation is good. The quality of her various nitrogen products is unsurpassed, and her production costs are well in line

with competitors. If advantage is taken of these favourable factors, Canada, under far-sighted management, should be able to supply in the post-war years her fair share of the world's requirements of nitrogen.

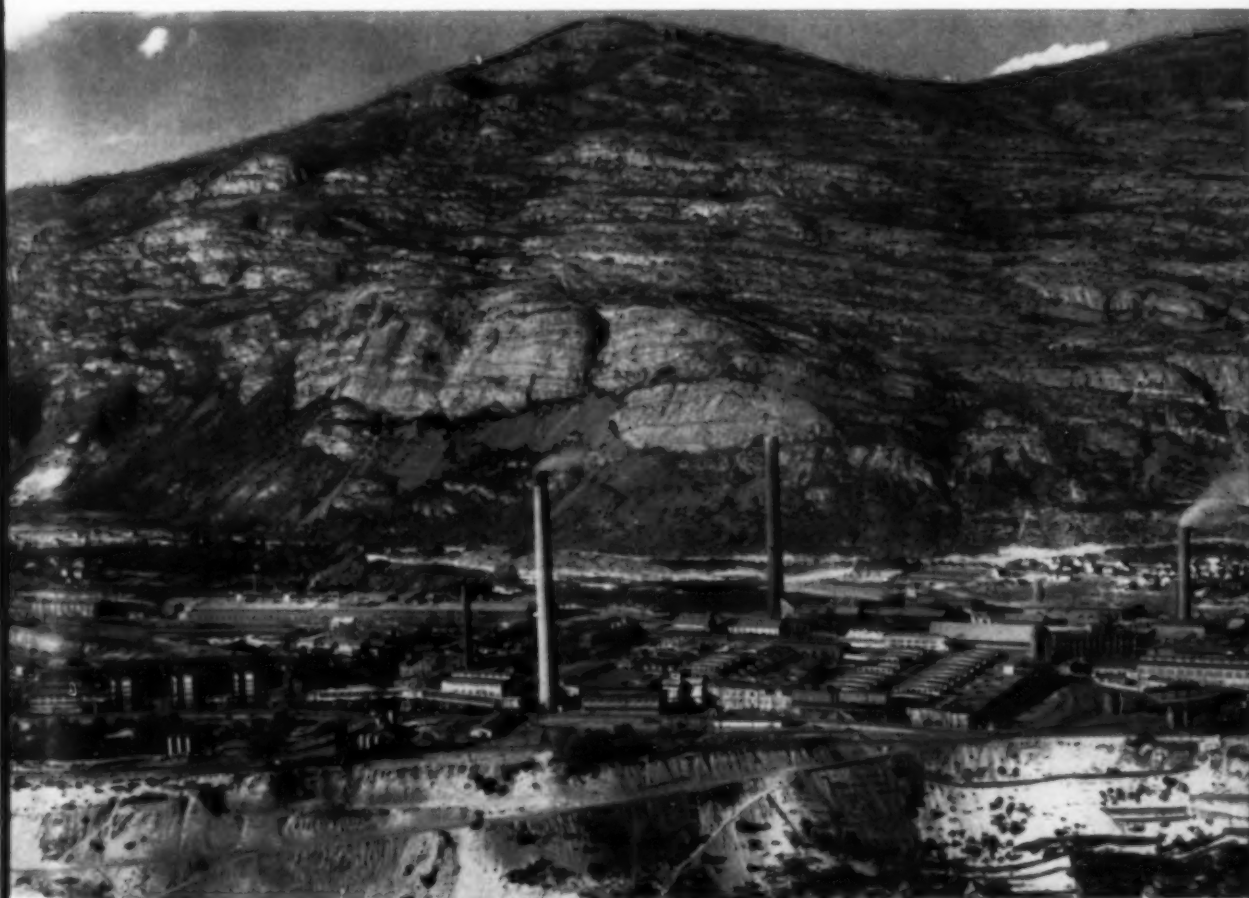
The author acknowledges, among others, the following sources of information:

MR. L. R. MACRAE,
Allied War Supplies Corporation,
Montreal, Que.,
"Canadian Wartime Ammonia"

DR. K. G. CLARK and M. S. SHERMAN,
U.S. Department of Agriculture,
"Pre-war World Production and
Consumption of Fertilizer"

"Chemical Nitrogen" report, No. 114,
U.S. Tariff Commission

General view of smelter and refinery at Tadanac, British Columbia—Consolidated Mining and Smelting Company Limited, Trail, British Columbia





Monuments Mark This Boundary

by KATHLEEN WEEKS

THROUGHOUT ITS LENGTH of approximately 3,000 miles, there is not a soldier or a gun to guard the boundary separating Canadian and United States territory; nothing but a long series of what are officially described as "monuments"—it may be a wooden post banked round with earth, an iron pillar marked with a date, or a cairn of stones six or eight feet high.

Some part of the eastern boundary dates back to the War of Independence, but the western portion, from the Lake of the Woods to the Pacific Coast—that long line following the 49th parallel of latitude—was not agreed upon until the Treaty of Washington was signed in 1846.

Two years later, Mr. John F. Crampton, the British Ambassador to Washington, urged upon the British and American Governments the necessity of appointing commissions and the sending of men to survey and mark the line agreed upon. Nothing was done until August, 1856, when Congress appointed a commission, the British Government following suit in December of the same year. It was to the Pacific Coast that their attention first turned, for the tide of immigration set most strongly in that direction.

The American Commissioner, Mr. Archibald Campbell, reached Esquimalt in June, 1857, a few days after Captain J. C. Prevost, R.N., one of Great Britain's Naval Commissioners. Captain G. H. Richards with HMS *Plumper* was delayed until November. They were to be responsible for the definition of the water boundary, a question which caused endless discussion, due to the ambiguous wording of the Treaty. It was finally settled

by arbitration years later. The survey of the land boundary was entrusted to Colonel J. S. Hawkins of the Royal Engineers, who arrived on the coast in July of the following year.

His commission from the Queen was dated March 30, 1858, and gave him instructions for "... marking out so much of the Boundary between Her Majesty's possessions in North America and the territories of the United States as is comprised between the Rocky Mountains and the point where the 49th parallel of North Latitude strikes the eastern shore of the Channel which separates the continent from Vancouver's Island..."¹

Mr. Campbell, after preliminary conferences with Captain Prevost during the summer of 1857, established a camp at Semiahmoo Bay, where he surveyed and marked the exact spot at which the 49th parallel met the sea. Captain Richards, when he arrived in November, immediately joined him there to make his own investigations. The result of his findings placed the position only eight feet from that determined by the Americans.

Members of the British party were surprised at Mr. Campbell's estimate of the expense of the work that lay ahead. Colonel B. Estcourt, R.E., who had carried out the survey of the eastern portion of the boundary between Quebec and Maine, had given his opinion that the work would cost about £32,000, but Mr. Campbell told them "... he had asked for an annual appropriation of

¹ Col. Hawkins' commission and all other references to his writings are quoted from *Certain Correspondence of the Foreign Office . . . Copied from Original Documents, International Boundary, 49th parallel* [by Otto Klotz], London, 1898. One of the few existing copies is to be seen in the Provincial Archives, Victoria, B.C.

MONUMENTS MARK THIS BOUNDARY

£45,000 for three years. Although he did not get this, it was much nearer the requisite amount than the British estimate, and the issue proved the correctness of his judgement."²

The American surveyors took great pride in their instruments, which Lieutenant Mayne of the *Plumper* describes as being of very good workmanship, and well packed for travelling. Not long before, all such instruments would have been imported from England, but these "... were made by Mr. Wordeman, an American, at Washington, who began life as a repairer of Troughton's instruments".

The British Land Commission left England on April 1, 1858. With Colonel Hawkins were Captain Haig, R.A., Lieutenants Darrah and Wilson of the Royal Engineers; J. K. Lord, naturalist; H. Bauerman, geolo-

gist. Dr. Lyall, R.N., of HMS *Plumper*, acting as botanist, joined them in Vancouver Island. In addition there were sixty-five non-commissioned officers and men of the Royal Engineers, topographers, photographers, surveyors, etc., and thirty axe-men.

Haig and Darrah were astronomers who were to work with the astronomers of the American Commission in establishing the position of the line. Lieutenant Wilson, as secretary to the Commission, in addition to being commissariat and supply officer, had a heavy responsibility and did more travelling in the course of his duties than most of the party.

In his book, *A Naturalist in British Columbia*, J. K. Lord gives some interesting details of the journey from England. They sailed on Good Friday in the "commodious steamer *Parana*", transferring to RMS *Trent* at the Danish town of St. Thomas. After a rough and unpleasant Atlantic crossing the

² Mayne, R.C. *Four Years in British Columbia and Vancouver Island*, London, 1862, p. 34.

Officers of the B.N.A. Boundary Commission. Standing (left to right):—Lt. Anderson, R.E., Col. Hawkins, R.E., Lt. Wilson, R.E. Sitting (left to right):—Capt. Darrah, R.E., Mr. Lord, Capt. Haig, R.A.

Courtesy B. C. Archives



men revelled in the sunshine and beauty of the Caribbean Sea.

Arrived at Colon, "... or Aspinwall, as the Americans have named it ...", much time was taken up in landing their tremendously heavy equipment. The Commissioner sent the men on at once to Panama, where the sailing frigate *Harannah* was awaiting them, while he and Lord with a small working party remained to bring on the baggage the next day.

Lord remarks on the enormous cost of crossing the Isthmus, though, unfortunately, he adds "... the actual amount I do not now remember". They were given a special train, and in order to see as much as possible of the strange and beautiful countryside, they spent the time standing in an open truck. Captain Harvey of the *Harannah* met them at Panama and the ship's boats were waiting to take men and baggage aboard.

Then followed a long and wearisome voyage; in order to get into the path of the trade winds they sailed far south. Lord says: "... we idled and idled along on the sea, sauntering, rather than sailing; with a blazing sun right over the masthead, the heat was intolerable ... All our fresh provisions had long been expended, and water reduced to a very small supply per diem, when on the 11th July, the seventieth day at sea, 'land on the starboard bow' was an announcement welcome to all."

They landed at Esquimalt on July 12, 1858, proud of the fact that they were the first British troops to be quartered in the Colony of Vancouver Island. They had brought with them tents complete with poles and pegs—the latter items unnecessary, one might think, in this land of trees and spars, but, in consequence, the whole force was comfortably housed under canvas in a remarkably short space of time.

The important part of Lieutenant Wilson's duties began immediately on landing. The responsibility for the comfort and physical well-being of every man in the force rested on his shoulders, as well as the hiring of additional labourers and the organizing of mule trains and Indian carrying parties.

Captain Haig and Lieutenant Darrah left on August 27 for Sumas prairie, a few miles from the Fraser River beyond Fort Langley, where the first astronomical station was to be set up. At that time Sumas was a rich grassy area, threaded with streams which combined their forces in the short, swift Sumas River, tributary to the Fraser; the area has since been drained and dyked. When the spring thaw caused immense volumes of snow water to swell the Fraser, increasing its flow to a mighty race, the smaller Sumas River would be forced back upon itself and the whole prairie turned into a shallow lake.

J. K. Lord wrote a book called *At Home in the Wilderness*; in it he says: "Any settler who might chance to visit this spot in the spring, would never dream that in July the prairie is completely under water ... How astonished he would be, on awakening some morning, to find that his land of promise was changing rapidly into a navigable lake ..."

In October, 1858, Lieutenant Wilson took a mule train across from Esquimalt to Haig and Darrah in their camp at Sumas. They embarked in the Hudson's Bay Company's SS *Otter*, which took them as far as Fort Langley on the Fraser. There they expected to transfer to a small river steamer which would take them the rest of the way, but it was so long in coming that Wilson decided to go on, hiring canoes from the Indians and leaving men to follow with the mules when the steamer came.

The weather was miserably cold and wet, and the canoe parties spent an uncomfortable night in the open, continuing their journey in the morning. It was not long before the heavily laden canoes grounded in the shallow Sumas Lake, and although the men waded waist deep they could not set them free. There was nothing to be done but to unload the boats, working all the time in the water, and to carry the supplies four or five miles to Haig's camp. They all arrived wet and exhausted, having eaten nothing since early morning.

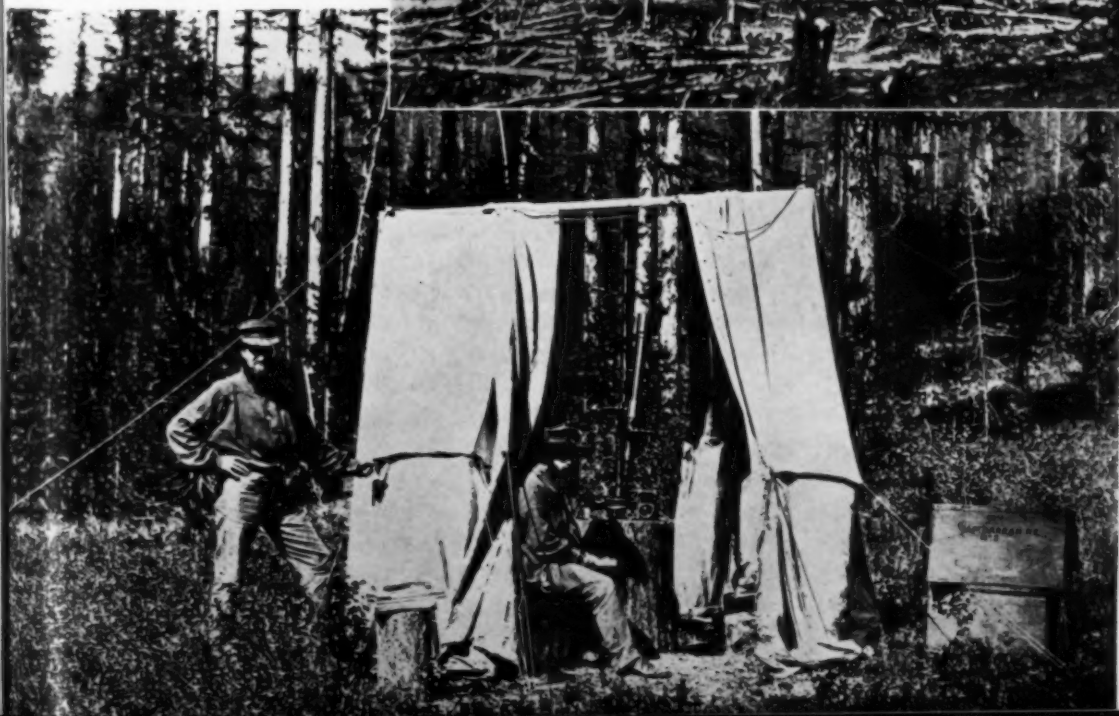
The return journey also was eventful. The steamer in which they made the trip was

B.N.A. Boundary Commission working on 49th parallel at Moyie River.

Courtesy B. C. Archives

Observatory tent of Boundary Commission at Yahk

Courtesy B. C. Archives





Group of members of B.N.A. Boundary Commission and the stage coach in which they travelled.

Courtesy B. C. Archives

crowded with miners returning to Victoria. They were a rough and mutinous lot, trying to seize control of the ship with a great show of revolvers. The commander, Captain Mouat, was, however, a man of determined character; he succeeded in "... quelling his riotous passengers without loss of life".

Early in December, with the coming of snow and cold weather, the survey parties were recalled to Esquimalt. The British Boundary Commission spent their first Canadian winter in comfortable quarters there, busy with indoor occupations of all kinds in preparation for the next year's work. The following summer they established a base at Sumas which was to be their headquarters while the work was carried eastward to the summit of the Cascade Mountains. All were impressed with the wonderful beauty of the situation, which Lord describes in the following words:

"Towering up from one bank of the stream-let rose the Cascade Mountains, densely wooded with pines and cedars; to the right lay the tranquil lake; to the left, and in

front, for about two miles, the green prairie, bounded by the Sumas River, that wound like a silver cord round the base of a distant hill. Wild fowl were in abundance ... whilst the mules and horses were knee deep in luxuriant grass."

Lieutenant Wilson, in his diary for 1859, has this to say of Sumas: "I think this is the most beautiful place I was ever in, the prairie, though small in comparison with the ones on the other side of the mountains, is most lovely, covered with flowers and strawberries and even in this early period of the year [June 16] the grass is nearly up to the waist."³

But they soon discovered to their cost that all was not as peaceful as it seemed. After they had been in camp about a week mosquitoes began to appear, increasing in numbers from day to day at an alarming rate, until they darkened the sky, getting into the food, into and under any protecting net—thriving, apparently, on the

³ *Lieut. Wilson's Diary*, vol. I, p. 41. Provincial Archives, Victoria, B.C.



Camp of the Boundary Commission at Fort Vancouver

Courtesy B. C. Archives

thickest smoke — biting through anything.

Lord says: "It was utterly impossible to work or write, one's entire time being occupied in slapping, stamping, grumbling, and savagely slaughtering mosquitoes." Mules and horses rolled on the ground in agony and plunged into the water to seek relief from their tormentors; officers and men began to show signs of fever. "To endure any longer such ceaseless persecution was impossible . . . To withdraw into the hills and abandon the work until winter was the only alternative. We were fairly vanquished—the labour of a hundred men and as many mules and horses put an end to by tiny flies." It may surprise some readers to know that mosquitoes—or sand flies—can kill a horse or a mule in a few hours, if nothing is done for its relief.

In winter also the beautiful Sumas prairie has its grim aspect, as the early seekers after gold found to their cost during the winter of 1858. Knowing nothing of severe winter weather, these men from California, seeing the abundant grass, chose Sumas and Chilli-

wack prairies as ideal winter quarters, having laid in no store of fodder for their animals. All went well until the snow came, burying everything so deep that the mules could not reach the grass.

Starving for want of food, they ate large quantities of the only thing available, the horse-tail rush. Lord says: "The effect of this plant was perfectly astounding. As soon as the mules began to eat it they were seized with a disease precisely resembling Asiatic cholera; the most violent purging came on, accompanied with cramps, rigours, utter prostration, speedy death. More than 500 mules died on these two prairies in less than a month." He adds that he had often seen mules eat the horse-tail rush with other food, and suffer no harm.⁴

While most of the Commission spent their second winter at Esquimalt, a few were at Sumas with Lord, who was responsible for the welfare of all the animals, numbering at that time forty-four horses and fifty-five mules—of which, at the end of two seasons'

⁴ Lord, J. K. *At Home in the Wilderness*, London, 1876, p. 18.

work, they had lost fourteen horses and eight mules from "accidents, mosquito bites, etc."

Profiting from the miners' experience of the previous year, Lord made careful preparations for the winter, storing tons of barley and having quantities of grass cut. He had a large square enclosed and open sheds built for the animals, driving them out twice a day to drink from ice holes cut in the stream.

The officers of the joint Commissions met at Semiahmoo in April, 1859, to discuss future plans. Much of the first season's work had been astronomical, establishing various points along the parallel between the coast and Sumas. In Mr. Campbell's opinion it was enough to define the position of the line at various points, only marking it permanently where it crossed rivers, trails or the vicinity of settlements. To this Colonel Hawkins could not agree; he felt that, in order to avoid any possibility of future questioning, the line should be continuously cut and permanently marked—that it was impossible to make an accurate survey without cutting the forest.

In his report he says: "... the principal object I had in view, in proposing the meeting ... [was] to bring under consideration the question of actually marking out the Boundary, as distinguished from merely ascertaining points upon the parallel ... by means of astronomical observations ... I regret extremely that the U.S. Commissioner should have unconditionally declined to accede to the proposition to undertake the cutting of the Boundary."

Neither would Mr. Campbell agree to asking his government to share the cost of iron markers. It was arranged that the two parties should alternate in establishing astronomical positions between Chilliwack and the Columbia River, the British Commission to mark those between the Cascades and Semiahmoo.

Eventually the cutting was done at intervals, in strips of about half a mile, twenty feet wide on each side of the line, the British party doing most of the cutting. As to its efficacy, the following remarks by Lieutenant Mayne are interesting: "These periodical

visits to the boundary-line gave us some idea of the rapid growth of the bush in this country, and showed us how completely futile the mere cutting down of trees to mark a boundary in such a country is. We knew the position of the boundary-line, but could not find the stump which had been driven in to mark the spot ... " The gap in the larger trees could be seen from above, but Mayne could not force his way through the undergrowth which had sprung up along the line of the clearing—and this was only two years after the work had been done.

This luxuriant forest growth created one of the most serious of Lieutenant Wilson's many supply problems. He describes it in these words: "From Semiahmoo to Sumas the country is low, in many places very swampy, and covered with perhaps the densest forest that can be seen anywhere, for not only are many of the trees of enormous girth, from 25 to 35 feet in circumference, but the spaces between them are filled with an almost impenetrable mass of underbrush and fallen timber ..."⁵

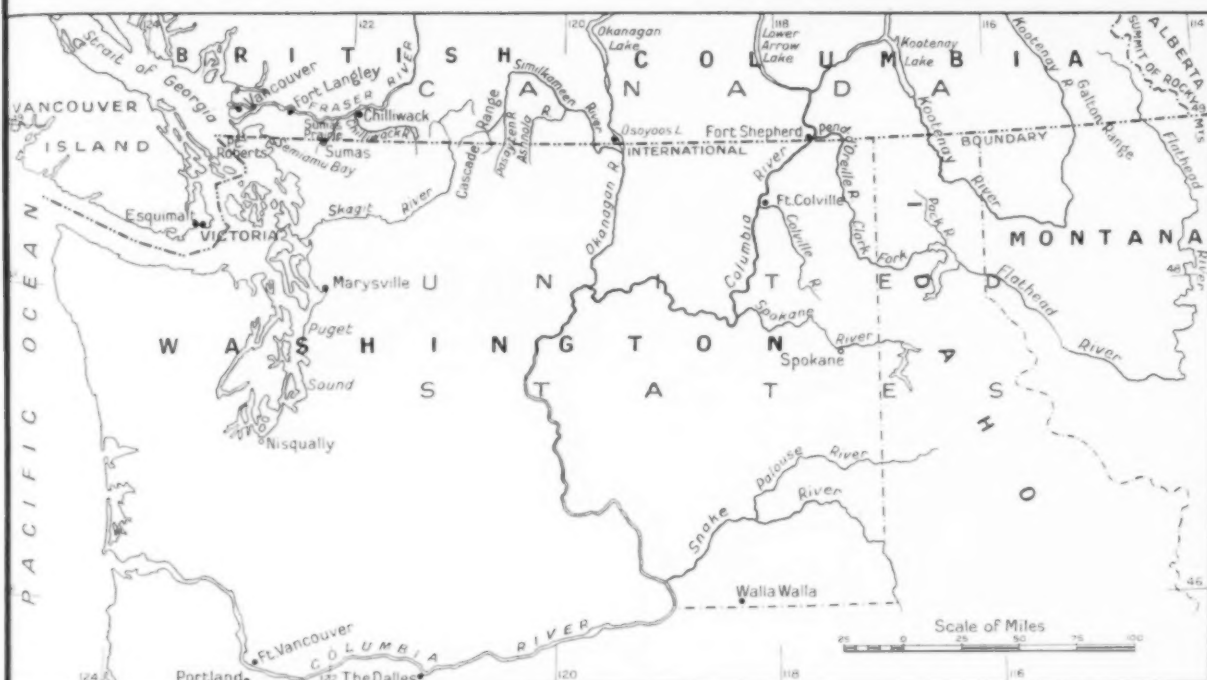
This meant that the animals could not forage for themselves at night, and barley had to be imported in vast quantities from Chile to Vancouver Island, being brought from there by paddle-steamer to Sumas. From the Commission's camp at Sumas to the summit of the Cascade Mountains was a fourteen-day journey for packed mules; if ten mules were making the journey, five of them had to be loaded with barley.

Working well into the winter of 1859, the western half of the line, reaching from the coast to the summit of the Cascades, was finished, with the exception of a short section between the Chilliwack and Skagit Rivers where a faulty survey had later to be redone. This part of the country had been reached from the Fraser River, with camps at Sumas and Chilliwack, and astronomical stations at intervals along the line.

With the coming of spring in the following year the British Commission prepared for the transfer to American territory, from

⁵ Porter, W. *History of the Corps of Royal Engineers*, London, 1889, vol. II, p. 261.

MONUMENTS MARK THIS BOUNDARY



C.G.J. MAP

which the eastern portion of the line, between the Cascades and the summit of the Rocky Mountains was to be reached.

First to move were the men and mules who had wintered at Sumas. Travelling overland from there to Nisqually, on Puget Sound, they embarked in *SS Otter*, chartered from the Hudson's Bay Company, on April 22, 1860, for Fort Vancouver. Returning to Esquimalt, the *Otter* took aboard the rest of the Commission with all their stores and equipment, leaving nothing but a few surplus articles in Vancouver Island.

They reached Fort Vancouver on May 1, where they received a warm welcome from the American garrison. Travelling on up the Columbia, at one point above Fort Vancouver all their equipment had to be landed and portaged for four and a half miles because of rapids. The Commission established a temporary base at The Dalles, on the Columbia, where they remained until the middle of June.

Lieutenant Wilson in his diary, dated May 24, 1860, gives a description of their new quarters: "The Dalles is the outpost of civ-

ilization on this side of the mountains, (if it may be called civilized), it is a most strange place and a very motley crowd live in it; American officers, trappers in their buck skin, regular wild men of the plains, who . . . obey no laws but their own inclinations, Jewish pedlars . . . hard featured Yankees . . . waggon teamsters, muleteers, Canadian voyageurs and niggers all jumbled up together, with a sprinkling of Indians on their wild horses galloping about."

Meanwhile J. K. Lord had left Esquimalt in February, travelling to San Francisco, to purchase more mules for the work that lay ahead. He tells the story in *A Naturalist in British Columbia* (two volumes, published in 1866). Soon after his arrival in San Francisco he received a telegram from Colonel Hawkins, arranging a meeting there. The Commissioner had left for England in October, 1859, taking home despatches with reference to the water boundary deadlock, and was now returning.

Going from place to place—Stockton, Nevada, Marysville and Red Bluffs—Lord purchased, in all, eighty mules and one bell

mare, buying twenty-one mules at Stockton and the rest at Red Bluffs. He paid an average price of \$120.00 each, with full equipment. By May 1st he was ready to start for The Dalles, where the Commission was awaiting him.

In spite of many warnings of hostile Indians and impassable rivers, Lord determined to find his way by a practically unknown route through Oregon, in preference to the well travelled way to Portland, thus shortening his journey by many weeks. On their first night out the men on guard fell asleep, waking in the morning to find all the mules scattered and disappeared! Three days had passed before they were rounded up and ready to start again.

They met with many difficulties on the way; two of the mules strayed and were lost, two were stolen, presumably by Indians. The Deschutes River proved a stiff barrier, they had to swim the mules across, building rafts on which to ferry their goods. But, in spite of these and many other hazards, they joined the Commission safely just one month after leaving Red Bluffs, having made a perilous journey of several hundred miles across little-known territory where there were no

trails, or only those used by the often hostile Indians.

Still there were not enough mules for the work that lay ahead. In search of more, Lord made a trip to Walla Walla, about a hundred miles farther up the Columbia, and then inland another thirty miles by stage to New Walla Walla. The journey upstream took three days in the small steamer *Colonel Wright*, fighting its way against the current of the flooded river with all the power of its enormous stern-wheel.

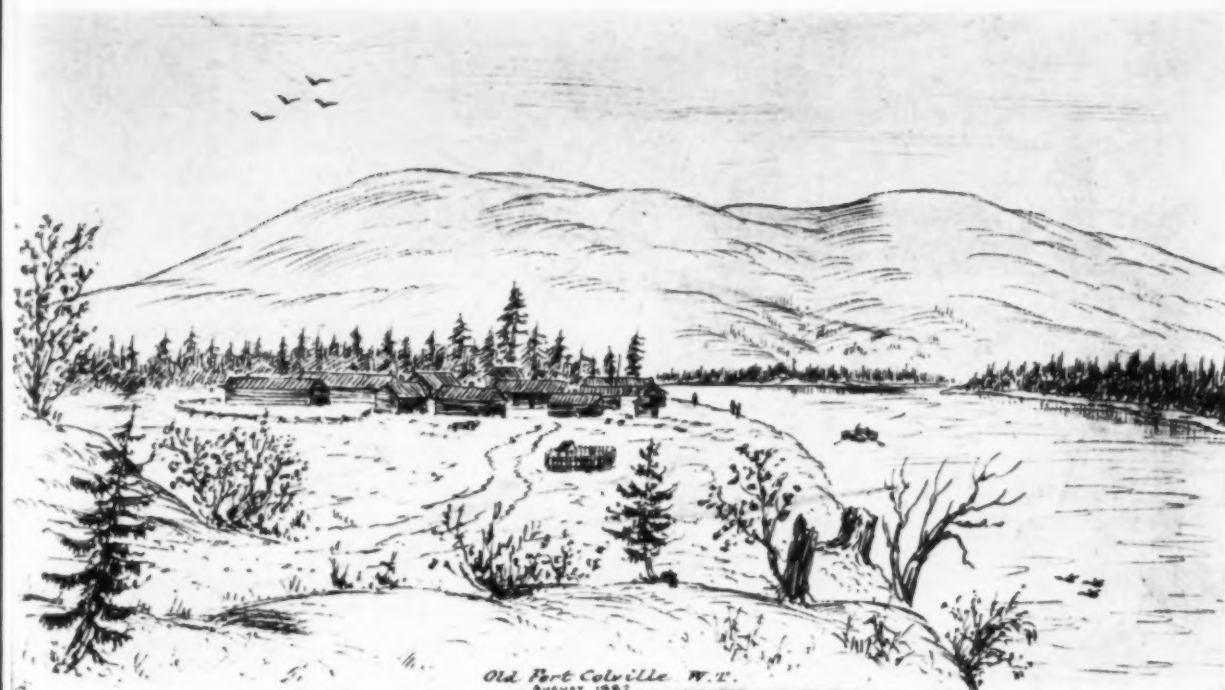
After successfully buying some mules Lord had an exciting trip back to The Dalles. The stage driver lost his way in a terrific storm and they spent the night in the open, being only just in time to catch the steamer in the morning—had they missed it Lord would have had to wait a month for its return. Where they had taken three days to fight their way upstream, returning, they covered the same distance in six hours!

Haig and Darrah were the first to leave The Dalles to begin the season's work. Heading northward up the Columbia toward the Okanagan River, they were to work westward, establishing camps at Ashnola and Pysaton Rivers and working toward Rock

Buildings at Fort Colville about 1860

Courtesy B. C. Archives





Old Fort Colville, August, 1882

Courtesy B. C. Archives

Creek and the Similkameen River, connecting up with the surveys of the previous year.

They left on June 4th, reaching Osoyoos two weeks later. Colonel Hawkins says of their journey: "... in its course seven rivers were ferried, either with the assistance of Indians and their canoes, by rafting, or by hewing out canoes on the spot, which operations caused a delay in the actual travelling of six or seven days". Captain Darrah built a ferry for his frequent crossings of the Columbia between Fort Shepherd and the Pend Oreille River. His party did not rejoin the Commission until December 16.

On June 14, 1860, the rest of the Commission left The Dalles for Walla Walla, leaving there two weeks later for Fort Colville⁶ which was to be their permanent headquarters while they were on American territory. Lieutenant Wilson, leaving two days earlier, rode ahead with one companion across the great bend of the Columbia, crossing the Spokane and Snake Rivers. He reached Fort Colville almost two weeks before the others, having accomplished what

he had been told was an impossible journey, and began preparations for their arrival.

Their depot was about two miles from the Hudson's Bay Company's fort; it consisted of log houses with bunks round the sides for the men, a general mess room and small houses for each of the officers. They found them rather dreary quarters with long months of snow and winter cold, though Lord says they had many pleasant memories of cheerful evenings spent with the Hudson's Bay officials at the fort.

The rest of the party did not reach Colville until July 12th, after a strenuous journey. Colonel Hawkins points out in his report that the cost of transport alone for 1860 must be "enormous", probably in the region of £10,000; it was a matter of continual anxiety to him. He writes: "A large amount of trail-making, bridging, corduroying, etc., forming some of the most expensive and tedious portions of the operations".

When they were fortunate enough to find bridge or ferry by which to cross a river the toll charge was 2/- per animal. At one point where it would be necessary to make frequent crossings Hawkins bought a ferry boat which had been built for the use of the

⁶ Throughout this article the accepted modern spelling of place-names has been used. The original HBC form of the name of this fort was Colvile. There are also variations in the spelling of some other names; e.g., old maps and records show Sumass or Smeas, and Chilukweyuk (Chilliwack).

American Commission the previous year. After four days' travel from Walla Walla they came to the Snake River, which they estimated to be four hundred yards wide at this point. There was a scow which had been used as a ferry, but the ropes had broken adrift and they had to paddle it across, drifting far downstream with the current at each crossing. It took them all day to get their stuff across.

The Snake River runs swift as a mill race through a deep channel worn in the rock—they were told it was possible to travel alongside it for days at a time, and yet be unable to reach the water two hundred feet below. Into it flows the Palouse River. Lord describes how it also is forced into a narrow channel between walls of basaltic rock: "... the entire river plunges over a vertical face of smooth rocks; down it surges a depth of 300 feet, and possibly more . . . The river, at least a hundred feet wide on the plain, is narrowed to about thirty at the place where it falls over the rocks . . . The sun shining brightly lights up the gloomy chasm, and gives the foaming current a brilliancy unlike anything I have ever seen—an effect heightened and intensified by contrast. I may aptly liken it . . . to a stream of liquid silver flowing through a channel of jet . . ."

Part of their journey was through sandy, treeless wastes, and they rejoiced when once again they came to pine trees and wild flowers—but also to the land of the sand-fly, tormenting alike to man and beast. They reached Colville on July 12th, and there they spent the two succeeding winters. Reinforcements from England had reached the Commission in April, consisting of a sergeant, quartermaster, commissary and twelve men under Lieutenant Anderson, a very capable surveyor. His work during the summer of 1860 was to re-survey the faulty section between the Chilliwack and Skagit Rivers—work which had been done by a civilian surveyor named McDonald.

In November, 1860, Mr. Campbell requested a meeting with the British Commissioner at Colville. For three days they discussed their undertakings, and Colonel Haw-

kins was glad to be able to report that, in contrast to their previous meeting, the discussions were entirely harmonious. Mr. Campbell agreed to the placing of iron markers, which Colonel Hawkins had ordered from England on his own responsibility. They were to be spaced out between the coast and the Cascades, and stone cairns from the Similkameen to the Columbia Rivers, with stone markers in accessible places between there and the summit of the Rockies.

After three seasons of continuous use, the scientific instruments of the Commission were in need of complete overhaul. They were sent to San Francisco, and to Lieutenant Wilson was entrusted the responsibility of bringing them back. When the Commission came in from the coast the weather had been dry and very hot; now, in December, there was snow on the ground and it was bitterly cold. Wilson set out from Colville accompanied only by one Scottish soldier, each of them riding horses, with two mules to carry their baggage.

It took them eleven days to reach Walla Walla, battling with snow and bitter winds all the way, until their horses gave in and they had to finish the journey on foot. From Walla Walla they went on by boat to The Dalles and Portland, doing the rest of the journey by sea to San Francisco. Wilson counted this as one of the hardest experiences of his life.

After spending a fortnight in San Francisco, while he collected some stores for the Commission and a large amount of cash, as well as the precious instruments, Wilson and his companion set out on the return journey. Colonel Hawkins sent Lord to Walla Walla with a mule train to meet them.

Owing to the United States Commission working one season ahead of the British they saw very little of each other. Hawkins says their work was "... conducted with energy and ability, and that nothing was allowed to be wanting in their organization and arrangements". They had a larger staff of officers and men, but in Hawkins' opinion the expenses of the two

Commissions would probably be comparable.

During the last season (1861), Colonel Hawkins expected to benefit from trails and bridges left by the United States' men from their work of the previous year, though he adds: "But still, the country is rugged, the trails are circuitous, and the distances to be travelled over very great, and the 'feed' for animals is generally sparse and indifferent. The travelling and provisioning of both man and animals have, throughout the expedition, been the greatest drawbacks to progress."

Owing to the urgent necessity for finishing the work during 1861 Colonel Hawkins decided to employ the whole force in the field. Captain Haig went to the eastern terminus of the line, Lieutenant Darrah westward to the Kootenay, while Lieutenant Anderson took the centre, working between the Kootenay and Flathead Valleys.

J. K. Lord, who accompanied Haig's party heading toward the summit of the Rocky Mountains, has left an interesting account of the gruelling journey involved. To begin with their route led south, following the Colville Valley to Spokane plains, grassy wastes resembling the Walla Walla country. Then, branching northeast, the trail led through thickly wooded country to the Pend Oreille River. He says: "The scenery is picturesque beyond description; densely wooded on each side, the river winds its way through a series of grassy banks, flat and verdant as English meadows."

Travelling from there through twenty-five miles of dreary forest they reached the Pack River, but on toward the Kootenay Valley the trees were less dense and there was plenty of food for the mules. Crossing the Kootenay River at the southeast bend, they reached the Tobacco plains where they found a small Hudson's Bay post in charge of a solitary white man.

From a corner of the Kootenay Valley they crossed the Galton Mountains, the range separating the Kootenay and Flathead Rivers; here they reached an elevation of 8,000 feet. Descending from there to the Flathead Valley, they began the final ascent



Boundary line ascending eastern slope of Silesia Creek Valley.

Courtesy Boundary Commission, Ottawa

of the Rocky Mountains, climbing gradually from 4,005 to 6,970 feet. Summit Camp, where they had their easternmost astronomical station, snugly sheltered under a massive mountain, stood at an elevation of 6,480 feet.

Lord says: "Wild and beautiful is the scenery on every side: right and left stupendous pinnacle-like hills, white with snow, seem to reach the clouds; ridge follows ridge, each seeming to be more craggy and massive than its fellow, as far as the eye can scan this wondrous landscape."

It was November before the survey work was finished and the line linked with the western section which ended at the summit of the Cascade Mountains. Lord says: "the Boundary line was completed too late to return that same year, so another dreary

winter was spent at Colville: the cold was so intense that the ink froze in the pens, even when it was kept hot before the fire, and thus put a stop to all writing. . . . Lieutenant Wilson wrote of frozen wine, and treacle that was like insufficiently boiled toffee.

While the winter was passing they made preparations for an early departure as soon as the spring came. Loads of barley were sent out on sleighs, and depots of food for the mules made along the route they would follow later. In this way much transport was saved and they were able to make an earlier start. They left in April, 1862, and found letters from home waiting for them at Spokane River—the first they had received for several months.

Lord says: "At Walla-walla we transferred all the mules and horses to some persons to whom the Commissioner had sold them, embarked in the steamer, reached The Dalles—thence the Cascades, Fort Vancouver and Portland, from which place the ocean-steamer took us to Vancouver Island to await shipment to England."⁷

The British Boundary Commission reached Esquimalt once more on May 14, 1862; exactly two months later they landed in England. There was still a great deal of executive work for many of them to do, however, and Lieutenant Wilson's duties kept him busy in London until the end of the year. He then received the thanks of the Secretary of State for Foreign Affairs for the work he had so ably performed for the Commission.

Returning to the question of marking the boundary, HMS *Plumper* helped in that part of the work during 1861, by taking to Semiahmoo Bay some of the forty-three iron monuments which had been sent out from England. These monuments were four feet high and six inches square, marked on one side "Treaty of Washington", on another "June 15, 1846".

Twenty-two of them were landed at the end of the boundary and three on the jutting headland of Point Roberts. It was low tide

when the *Plumper* reached Semiahmoo, and each of the pillars, weighing about a hundred pounds, had to be carried almost a mile across the wet sand. The gunboat *Grappler* took the remainder up the Fraser to the Sumas River.

They were set up at intervals of approximately a mile and a half between Semiahmoo and De Lacey's Whatcom trail. Captain Darrah superintended the placing of these monuments during the early winter months of 1862. About a hundred and eighteen other points were marked by pyramids of stones six or eight feet high, or by wooden posts banked with earth. In all, from Point Roberts to the Rocky Mountains, a distance of 409½ miles, 190 miles were cleared and marked at that time. The rest was left untouched because of the inaccessible nature of the country.

The United States' Commissioner had suggested that the spot where the 49th parallel met the sea, on the western face of Point Roberts, should be marked by a monument of a different nature. Colonel Hawkins, after consultation with the two British Naval Commissioners, agreed to the erection of a stone obelisk. The contract for making it was given to Mr. E. Brown of New Westminster. On it was carved:

South side: "Archibald Campbell, U.S. Commissr"; north side, "Capt. J. C. Prevost, R.N., Capt. G. H. Richards, R.N., Lt. Col. J. S. Hawkins, R.E., H.B.M. Commissrs"; east side, "Lat. 49° 0', 0'', Long. 123°, 3', 53'', erected 1861"; west side, "Treaty of Washington, June 15th, 1846."

The cost, \$7,590.38, was shared by the British and American Governments. When work in the field was finished, and the British Commission had returned to Esquimalt, Colonel Hawkins went to inspect Mr. Brown's work. The *British Columbian* for Saturday, May 17, 1862, has the following item in its news column:

"H.M. Gunboat *Forward*, came into port on Thursday evening and took Colonel Hawkins and Capt. Gosset [W. Driscoll Gosset was the Colonial Treasurer for the Colony of British Columbia] over to Point

⁷ Lord, J. K., *A Naturalist in British Columbia*, London, 1866, vol. II, p. 262.

Roberts to view the obelisk recently erected to mark the Boundary line where it strikes the Gulf of Georgia . . ."

Neither the British nor the American Governments published the reports of their Boundary Commissioners, and, by a strange coincidence, both were lost. In 1872, when Mr. Campbell was appointed United States Commissioner to work with a party of Royal Engineers under Captain Featherstonehaugh in closing the remaining gap in the defining of the boundary (between the summit of the Rockies and the Lake of the Woods), he asked his government for the use of his notes and records of the earlier work. These apparently, he did not return, and they have not been seen since.

To Dr. Otto Klotz, later Chief Astronomer, goes the credit for finding the British records. Going to London and St. Petersburg on a special mission, in 1898, he was asked also to make enquiries for the missing papers. He visited all the government offices in London without success. He writes: "Before leaving England, however, the writer . . . naturally paid a visit to the Royal Observatory at Greenwich. By chance his eye caught the initials B.N.A. on some boxes on the top of the library shelves—letters at once interpreted as possibly standing for 'British North America'. The boxes were taken down, the dust of years removed, and in them lay the long-lost records of the international survey of the forty-ninth parallel."⁸

The cost of this tremendous undertaking to the British Government is not known, but the United States spent \$595,233.03 on the work. Since the original survey was made, parts of the line have been rechecked from time to time, the position of every monument has been investigated and many others have been added.

The completion of the survey of this section of the boundary, as Colonel Hawkins wished it to be done, was provided for by concurrent action of the Governments of

the United States and Great Britain in 1902 and 1903. Commissioners were designated to act jointly for the purpose of renewing lost or damaged monuments, placing additional monuments where such were needed and clearing the vista through the wooded sections along the boundary line from the summit of the Rocky Mountains to the eastern shore of the Gulf of Georgia. This work was done during the years from 1901 to 1908. A later treaty signed at Washington on February 24, 1925, provides for the maintenance of the whole boundary line between Canada and the United States and Alaska in a state of effective demarcation.⁹

The story of the original survey is one of endurance and enterprise—of patient attention to detail that the work might be well done. Reading of it in these days of easy communications helps one to realize the extraordinary amount of progress that has been crowded into the brief history of British Columbia.

⁹ Report, *International Boundary Commission Re-establishment of the Boundary . . . Gulf of Georgia to Northwesternmost Point of Lake of the Woods*, Ottawa, 1937.



Courtesy Boundary Commission, Ottawa

⁸ Klotz, O., "The History of the Forty-ninth Parallel Survey West of the Rocky Mountains", *Geographical Review*, vol. III, no. 5, 1917, pp. 384-5.

Initial monument



John Canuck Applies For Dependents' Allowance

by W/C H.T.I. LEE and S/L BASIL DEAN

THE long evening shadows, cast by the hills to the west, reached out to envelop the village as it lay in the mist-enshrouded valley. The narrow streets, lying between shabby lime, mud and bamboo houses, had been filled a little earlier with soldiers in the uniform of Japan and with undernourished Chinese coolies. Now, except for an occasional clatter from the boots of a Japanese patrol making its rounds, they

R.C.A.F. photographs by F/Sgt. G. T. Berry.

were silent. This was Eastern China, occupied but unconquered.

In the gathering dusk a stealthy figure crept across the farm lands just outside the village, seeking cover from every available building, and evidently avoiding the attention of any member of the Japanese army. Unseen, he reached the silent village street, came to a door and knocked. As the door opened, he slipped quickly inside,

and the door closed inaudibly behind him. The door remained closed, the house silent, until the Japanese patrol had once more clattered past. Then the stooping, furtive figure slipped out again and disappeared into the shadows. Once more, the wife of a member of the Canadian armed services had received her monthly entitlement of dependents' allowance and assigned pay.

That transaction is one of more than half a million monthly payments made by the Dependents' Allowance and Assigned Pay Branch of the Canadian Treasury in Ottawa. The history of this particular episode began when a Chinese resident of Canada enlisted in the Canadian forces and applied for dependents' allowance on behalf of his wife, who was living in Occupied China. The method of payment is admittedly unusual; most payments are made by cheque, of which the D.A. and A.P. Branch writes about 550,000 every month (with another 82,000 originating with Navy Treasury). The story is, however, typical of the care which the Canadian Government has taken to ensure that monthly payments to wives, children and dependent mothers or other relatives of members of the three armed services reach the right recipient regularly and on time.

Similar interesting stories could be related in connection with payments being made to dependents located outside Canada, as cheques are sent to addresses in South America, Italy, Greece, France, Belgium, Holland, India, Syria, Malta, Palestine, Southern Rhodesia, Iceland, British West Indies, Newfoundland, Alaska—in fact to any place where dependents are located and can be reached.

In the particular case of the Chinese dependent wife, it was necessary, after payment had been authorized, to clear a monthly Treasury cheque through a New York agent of one of the Canadian chartered banks, thence to a correspondent bank in unoccupied China. At this point, the Treasury draft was converted into currency negotiable in Jap-occupied China and sent to the recipient by a courier of the Chinese underground who, for obvious reasons,

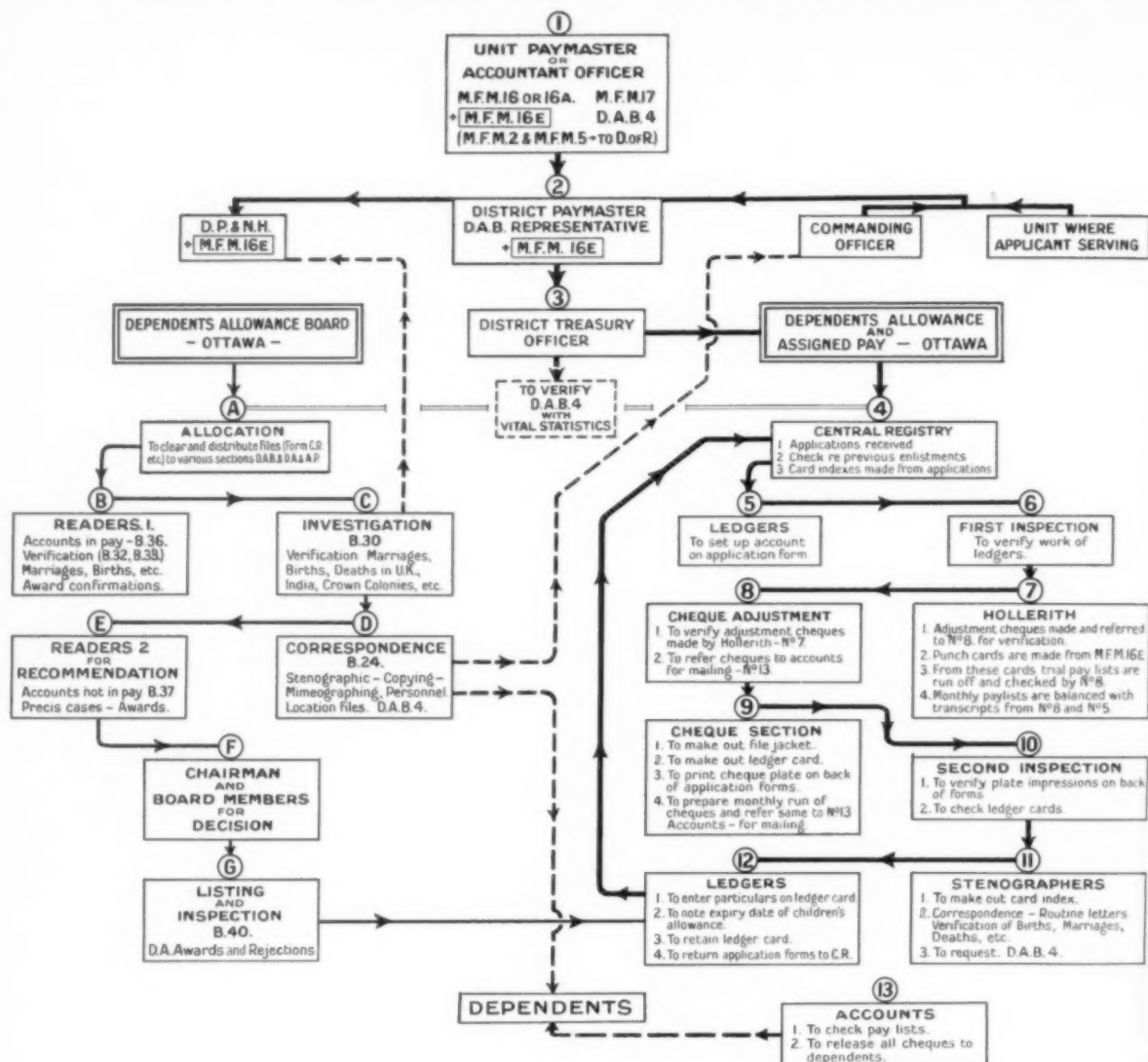
makes delivery at the peril of his own life. But, on the best available information, Ottawa is convinced that the payments have been duly made.

In the big Records Building of the Central Experimental Farm at Ottawa, a staff of 1,500 operates one of the biggest monthly account-paying operations in the world. By comparison with their monthly output of 550,000 cheques, the largest trust company in the United States handles about half a million each month. The Records Building houses the seven members of the Dependents' Allowance Board—a chairman and two representatives of each of the three services—who are present daily to consider applications for grant of dependents' allowance and to direct the policy of the entire organization. All seven members of the Board, together with its legal adviser and secretary, have seen service in the armed forces either in this war or the last, a fact which has an important bearing on their approach to their difficult task.

The Board, its staff, and the members of the D.A. and A.P. Branch operate on a simple, constant principle: "Get the money out on time. Put yourself in the place of a soldier's wife and remember how you would feel if your pay-cheque were late." The elaborate but smoothly-operating system of distributing monthly cheques has been built on that fundamental hypothesis, and while the Board and its staff will readily admit that there have been, and still are, isolated instances of delay, they can justifiably point proudly to the fact that such instances form a microscopic proportion of the total number of disbursements each month.

Preparing for a war which they hoped would never come, senior officers of the Canadian Treasury went to work in 1939 to lay the foundations of a system for handling dependents' allowance payments. It now seems somewhat miraculous that the official Treasury text-book outlining this system, together with complete plans for putting it into operation immediately mobilization was ordered, was completed on August 21st,

MOVEMENT OF DEPENDENTS ALLOWANCE APPLICATION FORMS



DEPENDENTS ALLOWANCE

PAYABLE UNDER ARTICLE 101(a) and (b) F.R. & I.

Effective 9th December 1943

DEPENDENT	OTHER RANKS	WARRANT OFFICER CLASS I	SUB/LIEUT. LIEUT. P.O.-F.O.	LIEUT. CAPT. F/L.	LT.COMDR MAJOR S/L.	COMDR. LT. COL. W/C.
WIFE	37-20	42-20	47-20	52-20	57-20	62-20
FIRST CHILD 13-92	51-12	56-12	61-12	66-12	71-12	76-12
SECOND " 12-00	63-12	68-12	73-12	78-12	83-12	88-12
THIRD " 10-00	73-12	78-12	83-12	88-12	93-12	98-12
FOURTH " 8-00	81-12	86-12	91-12	96-12	101-12	106-12
FIFTH " 8-00	89-12	94-12	99-12	104-12	109-12	114-12
SIXTH " 8-00	97-12	102-12	107-12	112-12	117-12	122-12

KEY TO LETTER PREFIX DESIGNATIONS - D.A.B.

<u>LETTER</u>	<u>DISTRICT</u>	<u>LOCATION</u>	<u>LETTER</u>	<u>DISTRICT</u>	<u>LOCATION</u>
A	- M.D. 1	LONDON ONT.	F	- M.D. 6	HALIFAX N.S.
B	- M.D. 2	TORONTO ONT.	G	- M.D. 7	SAINT JOHN N.B.
C	- M.D. 3	KINGSTON ONT.	H	- M.D. 10	WINNIPEG MAN.
D	- M.D. 4	MONTREAL P.Q.	K	- M.D. 11	VANCOUVER B.C.
E	- M.D. 5	QUEBEC P.Q.	L	- M.D. 12	REGINA SASK.
		M - M.D. 13	CALGARY ALTA.		
<u>LETTER</u>	<u>DIVISION</u>	<u>LETTER</u>	<u>DIVISION</u>		
S.C.	- Army Headquarters	W	- Womens Division - Army and Air Force		
T	- Fire Fighters	X	- Air Force		
U	- Overseas Enlistments and Auxiliary Services Supervisors (Army)	X.Z.	- Auxiliary Services Supervisors (i.e. Knights of Columbus - Canadian Legion Salvation Army - Y. M.C.A.) - R.C.A.F. -		
V	- Navy				

1939—eleven days before Hitler marched into Poland. One of the Federal Government's first wartime acts, after mobilization of the three services, was to set up, by Order in Council, a Dependents' Allowance Board which was to rule on all individual cases within the framework of the policy already laid down. Naturally, the majority of cases are straightforward and cast-iron: e. g.—a man is legally married, living with his wife and has two children. These cases are a matter of simple routine, and no special discussion is needed before payment of the usual allowances is authorized. Others, however, are not so easy: e.g.—separated couples, or mothers or other relatives whose dependence on the enlisted man has not been clearly established. In such cases the Board investigates (with careful tact) and hands down its decision.

Once a case has been decided and payment of an allowance authorized, the mechanics of actual payment are turned over to the clerical and accounting staff. From then on, it follows a standard course, which invariably begins with the embossing of an address plate and ends with the delivery of a cheque three business days before the end of each calendar month.

Popular superstition has credited the Civil Service with an all-consuming love of red tape, paper work and time-consuming, unproductive activity; the Service has also been credited by its multitude of glib critics with an absence of soul. This article is not intended to answer these criticisms, nor to enter into an apologia for the Civil

Service. But alongside this criticism there is the general attitude among most people that any organization loses the human instinct at a rate which is in direct proportion to its physical growth. Clichés about "soulless corporations" appear frequently enough in all kinds of public pronouncements.

As if to forestall any such criticism, the Dependents' Allowance Board emphasized its concern with getting the allowance cheques out promptly more and more insistently as its activities extended. The cardinal sin in the Records Building which houses the staff, or in Ottawa's No. 5 Temporary Building, where Treasury branch employees handle the actual production of regular run cheques, is to commit an error which results in some wife's or mother's cheque being late for that month. And, since quite a fair proportion of the staff is made up of women who are related, by marriage or otherwise, to men in the armed services, the stigma of having committed such an error is one which is not easily forgotten by the errant clerk.

Obviously, any organization which has to write, balance and mail 550,000 cheques a month must be a big one. To save untold quantities of manpower, this job has been put on a strictly mass-production basis, with the elaborate and sensitive system of counterbalances and cross-checks which any mass-production system involves.

The system may best be described by taking the mythical case of Mrs. Jane Canuck, wife of B-205282 Pte. John Canuck, of the Canadian Army. John has just enlisted in the army, and on enlistment



*Treasury Office, Cheque Disbursement Division
—section of embossing room*

declares himself as having a wife with two children, by filling out the army's standard application form for dependents' allowance, Form M.F.M.16. On this form, he is required to answer various questions (there are 28 sections) which will establish his family status; it is John's regimental paymaster's responsibility to ensure that he understands the questions and answers them correctly. After completing that form, he then fills out another, known as M. F. M. 17, in which he assigns at least fifteen days' pay (which the army, for the sake of convenience, sets at \$20 for all men below the rank of sergeant getting less than \$1.40 per day basic pay) in order to qualify for dependents' allowance. The amount increases with higher non-commissioned and warrant ranks.

According to regulations which the armed services rigidly enforce, these forms have to be forwarded to Ottawa *daily* by each unit, so that there will be no delay in having Mrs. Canuck's case dealt with. Once the forms reach the D.A. and A.P. Branch,

Operator at work on graphotype machine—the embossing of the stencils

they are pushed through rapidly, and an interim adjustment cheque is issued immediately. This adjustment cheque is sent before any verification of the facts on Pte. Canuck's application is attempted. All the checking back to make sure that there is a Mrs. Jane Canuck and that she has two children, is done *after* the necessary steps have been taken to get the first cheque on the way. This is one more example of the supreme priority given by the branch to its principle of getting the money out. By the end of the following month the regular run cheque is on its way to Mrs. Canuck and will continue with monthly regularity while John is in the service.

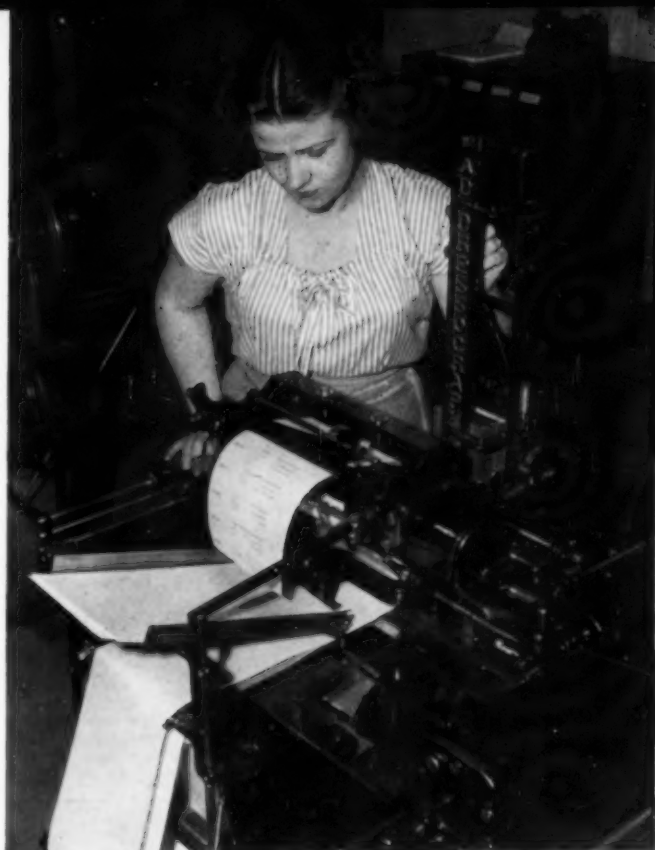
Mrs. Canuck's cheque will be made up as follows: \$37.20 dependents' allowance for herself, \$13.92 for the first child, \$12.00 for the second child and \$20 assigned pay. Total, \$83.12. The assigned pay will increase when Pte. Canuck is promoted.

On arrival at the D.A. and A.P. Branch, Pte. Canuck's application forms are fed into an electric date and time clock, which records on the forms the time and date of receipt down to the minute. This enables the branch to check and correct any undue delay in handling. And here it may be stated that Pte. Canuck's *original* forms are the ones which are used throughout in handling his case; this removes possibilities of copying errors. Placed in an envelope, they are started on their way through the necessary channels with a "flow sheet" attached. The flow sheet indicates the time they spend in each department, and so enables bottlenecks to be removed.



From information on the forms, two master index strips are made—one for Pte. Canuck and one for his wife. These strips are kept in a large index room, in which a record can be found of every member of the Canadian armed forces who has made an assignment of pay for any purpose whatsoever, as well as of his dependents.

After the index strips have been prepared, and calculations made as to the amount of dependents' allowance and assigned pay payable, the documents travel to the Machine Accounting Division. It is here that the mechanical wonders which facilitate the work of the branch are brought into play. In white and pink cards, punch holes are made; the punch holes record—and, when the cards are fed into a tabulating machine, will, on demand, reproduce in print—all the necessary information about Pte. Canuck and his family. Among other things, these cards enable various categories of dependents to be sorted out from the other 550,000 with incredible speed. For instance, if the Board wants to know in a hurry how many dependent children will become over-age, and will thus cease to be entitled to an allowance, on October 1st, these punched cards are fed into the sorting machine, the machine is set in motion, and in a few seconds all cards referring to such children will have been segregated from the rest. Further, all the cards can be run through the tabulating machine, which will automatically record the total of monthly payments, produce what the branch calls a "trial listing" sheet for checking purposes (containing the name, address and amount



Operating the listing machine.

of cheque for every recipient) and simultaneously add up the total.

Mrs. Canuck's first cheque will be what is known as an "adjustment" cheque; that is to say, it has been dealt with individually and not as part of the main cheque-producing system, for the reason, as stated earlier, that the branch considers it of the most vital importance to get the cheque out on time before going into the complex business of investigation, examination and cross-checking to which Mrs. Canuck's account will later be subjected. Her adjustment cheque is prepared from the remarkable tabulating machine, which prints her name, and the amount to which she is entitled, on the face of the cheque simply by the process of having the punched cards fed into it. All that then remains is for the cheque to be examined for accuracy (against the original forms which Pte. Canuck filled out when he enlisted), and then for it to be signed and mailed. The signing, too, is done by machine, a high-precision printing press which stamps the

Operators at work on the cheque-writing machine





signature of requisite authority on the cheque form. Placed in an envelope, the cheque goes to the mailing room, there to be despatched through regular mail channels in order to reach Mrs. Canuck without delay.

The next month's cheque for Mrs. Canuck will go through the mass-production system by which the vast majority of dependents' allowances are paid.

Once Mrs. Canuck's first cheque has been cleared from the D.A. and A.P. Branch the documents relating to her case are passed to the cheque section. Here, permanent 'addressograph' plates are embossed by machines that are more or less a cross between a typewriter and a linotype; the plates are made up of metal slugs into which have been punched Mrs. Canuck's name, address, her husband's name and regimental number, and the amount of her monthly entitlement. Once these plates have been checked for accuracy (again by comparison with Pte. Canuck's original forms), and various check cards and ledger forms have been taken from them, they are filed away in an enormous room full of cabinets containing similar plates for more than half a million other dependents, and there are kept ready for the next regular cheque run.

When the time comes for the cheque run to be started—about the tenth of each month, for although the cheque is not due in Mrs. Canuck's mail box until the end of the month, there are more than half a million others to be got out, too—each of the cabinets is wheeled into the cheque-writing machine room by means of an ingenious wheel-jack which lifts it an inch or so off the ground and makes handling easy. There, the plates are fed into the cheque-writing machines, a drawerful at a time.

The machines themselves are another example of man's ingenuity in saving labour. The average private bank customer, who writes his own cheques by hand, probably takes three minutes to write a cheque. Writing three thousand would therefore take him 150 hours; the cheque-writing machines turn out three thousand cheques an hour—and with an immeasurably

At top:—Operating the enveloping machine.

Left:—Filing the stencils in cabinets.



greater guarantee of accuracy! Once the embossed plates have been made, in fact, all possibility of error has been removed unless there was a mistake in Pte. Canuck's original form.

Drawerful by drawerful, the plates are fed into a rack on the machine, which then grasps one plate at a time, sets it in place, brings up a cheque form (it is so sensitive that if two cheques move into the machine on top of one another a red light flashes and the machine stops) and stamps the imprint of the plate on the face of the cheque. A second movement stamps the same imprint on what is called a "transcript", which is simply a continuous copy of the cheques which have been printed. Another section of the machine, working simultaneously, stamps on the necessary two signatures. Mrs. Canuck's cheque has been made up.

There still remains the small matter of putting 550,000 cheques into envelopes, and sealing them. Another machine does this, again at the comfortable rate of 3,000 an hour—collecting the cheques from one pile (with a super-sensitive automatic safeguard against putting two into one envelope), envelopes from another, opening the envelopes, slipping the cheques inside, then closing and sealing the flaps.

Assembled in batches of 500, they are collected, packed in boxes, stowed in special trunks and taken back to the D.A. and A.P. Branch to wait there while the monthly account is balanced. By about the 20th of each month, the whole run has been completed and balanced, and the cheques are ready for the mail.

To save strain on the Post Office Department, mailing of the cheques is "staggered"—cheques bound for the Pacific Coast are sent out first, others bound for the Prairies next, and so on, with Ontario bound cheques released last. By this arrangement the Post Office is given lots of time, and usually has the cheques in its local offices days ahead of final mailing date, which is invariably fixed to ensure that Mrs. Jane Canuck's

At top:—Packing dependents' allowance and assigned pay cheques for delivery to Dependents' Allowance and Assigned Pay Office.

Right:—Repair and maintenance man at work on cheque-writing machine



cheque is in her mail box three business days before the end of the month.

That, in simple terms, is how the system works. The description does not attempt to do justice to the thousands of hours of devoted effort which goes each month into the straight problem of getting each cheque out so that Mrs. Canuck will not have to fall behind in her rent or on the grocer's bill. The writer was astonished to learn, for instance, that women clerks who handle the embossed addressograph plates, each drawerful of which weighs thirteen pounds, lift and put down an average of two tons—4,000 pounds—dead weight every working day. It is not surprising that at the height of the cheque run they go home at night tired out.

There are many other aspects of the system with which there is too little space to deal adequately here. However, this survey so far has dealt primarily with the mechanics by which the straightforward, uncomplicated cases are dealt with. The job, as we hope we have shown, is difficult enough in itself; but a very large proportion of the Board's time, and the entire attention of a fairly considerable proportion of its staff, are devoted to the handling of cases which are, in a greater or lesser degree, involved and "difficult".

Even Pte. Canuck's case, which is of the simplest, will sooner or later produce a situation which requires the attention of one or other of the various sections of the Dependents' Allowance Board. When, for instance, he gets a promotion which raises his regimental pay above \$1.40 per day, he is required to increase his assignments from \$20 to \$23 a month; this promptly changes the amount of Mrs. Canuck's monthly cheque. Other increases will follow with further promotions. In the case of officers, the amount of dependents' allowance, as distinct from assigned pay, increases with certain promotions, and this again requires a change in the cheque.

All such items are dealt with in what is called the "Casualty Section", whose name does not mean that it restricts its attention to the tragedies of war; in official parlance, a "casualty" is anything which affects a man's pay, and includes promotion, leave without pay, absence without leave and reversion in rank in addition to death or becoming missing or a prisoner. Inevitably the report of promotion or any of these other changes in status, concerning every single member of the Canadian services supporting dependents, eventually reaches this Casualty Section, known to the Board as "B34". There, it is duly recorded and



**TREASURY OFFICE—
DEPENDENTS' ALLOWANCE
AND ASSIGNED PAY**

Back row (left to right):—
D. A. Fleming, Chief, Miscellaneous Assignments Division; J. R. Morin, Chief, Machine Accounting Division; Miss G. A. Sully, Assistant Chief, Personnel Division; Mrs. M. L. Taylor, Supervisor, Stenographic Pool; Miss E. E. Graham, Secretary to Chief Treasury Officer; A. R. Gardner, Chief, Inspection Division; J. M. Sutherland, Chief, Accounts Division.
Seated (left to right):—A. McDowall, Chief, Ledger Division; J. B. Cullen, Assistant Treasury Officer; T. Anderson, Chief Treasury Officer; H. J. Brown, Assistant Treasury Officer; D. G. Bisson, Chief Central Registry Division.



Machine Accounting Division:—
*section of punch-card room (top
 left); adjustment cheque-issuing
 machine (top right); card-sorting
 machine (centre left)*

Central Registry Division:—
*section of filing room (centre right);
 index section (right)*

CE—
 WANG
 PAY
 (right):—
 Miscel
 a Divi
 Chief
 g Divi
 Assist
 l Divi
 Taylor
 Graphi
 Graham
 Treasury
 r, Chief
 J. M
 account

(ht):—A
 Ledger
 Assist
 cer; T
 Treasury
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 er; D. G
 al Regis

action to adjust dependents' cheques is concurred in on the signed approval of at least two members of the Dependents' Allowance Board. However, it is again pointed out that action is immediately taken by Treasury to issue the required adjustment cheque so there will be no delay, and the other details are attended to later.

A particular set of rules applies to dependents of men who have been reported killed, missing or prisoners. If a man is reported missing, his dependents (generally speaking) go on receiving a cheque in the same monthly amount for six months from the date of the report. At the end of that time, if he is still simply "missing," the cheque is adjusted to conform with the pension which would be payable supposing he were dead, and continues as such until there is further news. If he is a prisoner, the cheque continues at least at the same amount as before his casualty.

If one of his relatives has been receiving an assigned pay cheque without dependents' allowance, payment is stopped on receipt of the report "missing", since it is assumed that this relative was not a dependent;

but at the same time the Board *automatically* starts an investigation, and if it is found that the relative was actually a dependent, though no previous application for allowance had been made, authorized payments are immediately put into effect. No one in Canada realizes better than the members of the Board the extreme delicacy of its operations at such a time, when families are usually distraught by tragedy; and everything possible is done to lighten the burden of wives and mothers during their days of dreadful anxiety.

Not fraught with tragedy, but full of problems, are the cases of growing dependent children who pass beyond the age where they are entitled to allowances. Boys cease to be eligible at sixteen, girls at seventeen, but if they remain at school and progress satisfactorily, allowances may be continued until they are nineteen. Beyond that age, only physical or mental infirmity is considered a qualification. Section B27 of the Board's staff takes care of these cases, ceaselessly checking over the files and sorting out the children who will soon be reaching the age limit, sending out forms by which extensions

DEPENDENTS' ALLOWANCE BOARD—SENIOR REVIEWERS

Front row:—Mrs. I. Edge, B22A; Mrs. D. Boyd, B41; Miss M. Leore, B35A; Mrs. P. Brooks, B44; Miss G. Mallon, B34; Miss N. O'Brien, B35; L. R. Precourt, B42
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Third row:—W. J. Valiquette, B46; Miss V. M. Parr, B20; Mrs. J. St. Louis, B38; Miss D. Duitman, E27; Miss F. L. Bell, B31; Mrs. D. Colton, B24; Mrs. F. Coburn, B34A; Miss M. Hickman, B33; Miss W. Tanner, E24; I. A. Sutherland, B21
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DEPENDENTS' ALLOWANCE BOARD—CHAIRMAN AND MEMBERS

Left to right around table:—S/L A. V. Ashdown (Air Force), Comdr. J. D. A. Blais (Navy), Col. T. Moss, M.C. (I.A.G.'s representative to Board), Mr. R. O. G. Bennett (Chairman), Major L. J. Carey, M.C. (Secretary), Lt.-Comdr. A. F. Hiron (Navy), W. C. H. T. I. Lee, M.C. (Air Force), Lt.-Col. E. J. S. Dudley, E. D. (Army). Inset:—Lt.-Col. J. G. Raymond (Army)

to the age of nineteen may be granted, examining the forms when they are returned duly completed, and arranging for allowances to be continued where further payment is approved. In the fall months, when children are returning to school, B27 handles 300 such cases each day.

The Family Welfare Section (B31) is perhaps the outstanding example of the care with which the Board discharges the job. Here the real "problem cases" are handled: adoptions and guardianships, dependents who have died (and care for any children who may be left orphaned), enquiries concerning applications for compassionate leave owing to bereavement, marital disturbance and the like, together with the familiar but no less painful domestic tragedies of deserting wives, illegitimate births, neglect of children, or divorce. The section acts in a liaison capacity between the

Board and the welfare agencies across the country, referring the cases to them for action. From the beginning it has had the unfailing co-operation of these established provincial and local welfare agencies—including some 33 private agencies and 100 Children's Aid Societies and the Provincial Welfare Departments.

The advantages of tackling problem cases through organizations which are familiar with conditions in each community, and which have the tremendous advantage of community support, are too obvious to need emphasis. Further, they, too, are fired with the belief that the serviceman's family is entitled to the best attention and assistance which it is possible to give them. The magnitude of the job which they have voluntarily assumed and so admirably executed may be judged, partially, from the fact that between 400 and 450 letters



go out daily from the Family Welfare Section of the Board, and that there are at all times around 1,000 files up for consideration in the offices occupied by the section. They have brought to this difficult job the humanity for which they have long since won the respect of their communities.

The terms of reference under which B31, and its associated section B20 (the Administration Section) conduct their operations have teeth in them which the Dependents' Allowance Board is reluctant, though sometimes compelled, to use. One article in the regulations governing the Board provides that where the serviceman is the only living parent, where the whereabouts of the mother is unknown, or where "she has been proven to the satisfaction of the Board to be incompetent of giving a child proper care", the man may designate a person or agency to care for the child and to whom the dependents' allowance may be paid. If he fails to do so, the Board, having proven the mother or the guardian whom he designates to be incompetent, may itself designate a person or agency, and authorize the payment of dependents' allowance to that recipient.

Naturally, the Board invariably hesitates to impose such stern measures; but occasionally, where children are clearly suffering as a result of neglect, it enforces the regulation, and makes better provision for their care. Such a step is not taken as a punishment for the wife; the Board's aim is to ensure that the children are well

Dependents' allowance and assigned pay cheques on their way to the Post Office ready for mailing to the dependents of service personnel.

cared for and that the serviceman's home is preserved. Needless to say, all persons or agencies so designated by the Board are required to give an accounting of the money which they receive and of the manner in which the children are being cared for, physically, spiritually and mentally.

Another source of constant problems is allowances for dependent mothers and fathers. Fundamentally, the Board requires that before an allowance can be granted it must be proved that the mother or father was in fact dependent on the serviceman before his enlistment or had become so since enlistment. Section B38, known as the Parents' Section, deals with these cases, and a single man or widower without dependent children must assign 15 days' pay before an allowance will be granted; a married man, who has already assigned 15 days' pay to his wife, must assign a further five days' pay to the dependent relative.

But all cases are not as simple as that. A man may be thousands of miles away at an overseas battle station when sudden illness or bereavement creates a condition of dependency which did not exist before. In such cases, a cable is sent to ascertain his wishes, and immediately a cable reply is received that he will assign pay, a cheque is started on its way. There is no waiting for official forms to be returned through unpredictable wartime mails. When such forms do finally arrive, the award is confirmed.

Constantly checking and reviewing all doubtful cases is a staff of experts who work under the direction of the Chief Reviewer, Special Cases, B22. All these reviewers, B22A, B41, B50, are specialists in some particular aspect of dependents' allowances, and frequently their reviewing brings out new information or points which change the complexion of a case and enable the Board to make an award where, on the basis of previous information submitted, no such award was possible. Space does not permit us to tell the nature and importance of the work of the Readers Section, B36 and B37,

JOHN CANUCK APPLIES FOR DEPENDENTS' ALLOWANCE

—headed by B35 and assisted by B35A—which handles about 900 cases per day.

These bare recitals of staff duties fail in the essential purpose of their reiteration: they do not, and cannot, describe the care which goes into consideration of every individual case—and there are more than 1,000,000 files in Central Registry. Nor do they do justice to the efforts which go into the vital business of ensuring that Pte. Canuck, facing the enemy from a fox-hole, is not obsessed with worry as to how his family is making out back home.

The investigation branch, B30, will speedily and readily inquire into, and answer, any request for information about home circumstances which Pte. Canuck may forward through his commanding officer, and will do its best at all times to set his mind at rest about the welfare of his family. There are other requests for information to be dealt with too: separation, divorce, wives who have begun to forget their husbands, invalid marriages, illegitimate children, and all the other facets of domestic tragedy. There were 38,000 requests for information on these and similar subjects last year; and all were investigated and answered. The investigation is done usually

not by the staff of the Board or the branch itself but through the co-operation of the local welfare agencies, and through the Federal Department of Veterans' Affairs and the Soldier Settlement and Veterans' Land Act Department. By no means are all of these investigations confined to Canada: many of them must be carried out in the United States and Great Britain, and some have been encountered in places as unlikely as Persia and Ceylon.

A very important step was taken during the past year when an Overseas Committee Dependents' Allowance Board was set up at Canadian Military Headquarters, London, England, with full power to handle all cases where overseas dependents are concerned. This action resulted in a definite saving of time, and the action was welcomed by the members of the armed forces overseas.

At the same time as the Overseas Committee was being organized, a Dependents' Allowance Board representative was also appointed at Canadian Military Headquarters, and an Overseas Section—B22—was established at the Board in Ottawa to ensure that overseas cases received preferred attention, and that a daily contact was maintained with the Committee and overseas representatives by cable.

In Canada, offices of the Board's representatives are located in the principal cities, usually at District or Command Headquarters. These are officers representing their respective services and constitute a link between the dependents in the adjacent area and the Board in Ottawa. They make periodic visits to the Board and are visited by the chairman and members of the Board so that effective liaison is maintained at all times.

In this article, it has been possible to deal only briefly with the functions and operations of the Board, but the dependents of the serving members of Canada's armed forces can rest assured that every possible consideration is given to each individual case. The Board is not a machine but an understanding body keenly alive to its responsibilities.

*Central Registry Division, Treasury Office—
close-up of index panels*







The simple and ancient market cross at Castle Combe

British Council photo

England's Old Country Markets

by ARTHUR GAUNT

AMONG the customs still observed in England, that of holding regular open-air markets in the country towns is one of the very oldest. The number of such markets has dwindled in modern times, but many still take place, and the widespread observance of the custom in earlier days is shown by the many old market crosses, market squares, and market houses remaining.

Such souvenirs are to be found in many places which no longer rank as market towns, but which had market charters in past centuries. The development of travel facilities obviated the need for more than a

limited number of markets, but relics of those earlier and more specious days are preserved.

The idea of establishing a fixed place for buying and selling is one of the earliest in civilization, but it is from the date of the charter sanctioning the custom that the age of a market is usually reckoned. In Britain, such charters conferring the right to hold a regular market were granted by the sovereign, the lord of the manor, or the church or abbey authorities.

There is Domesday Book evidence of markets before the Norman Conquest (Wor-

Top left:—Poultry cross and Minster Street, Salisbury, Wiltshire—a relic of the days when markets were established for the sale of specified types of produce or merchandise.

Bottom left:—The ornate and comparatively modern market cross at Beverley, East Yorkshire

British Council photos



Left:—The eighteenth century market building at Bingley, Airedale

Right:—The main street at Kilham, an East Yorkshire village which once had a market charter and which is still referred to as one of the Yorkshire "Wold Towns".

cester is believed to have had one as early as the year 873, and Taunton's market goes back to the year 900), though the Conqueror did edict that public buying and selling were to take place where they could be supervised. An effort to regularize the custom still further was made in drafting Magna Charta, for one clause stated, "Merchants shall be free to go and come, buy and sell, without evil tolls".

The history of market charters is a story in itself, and it should be noted that two types of charter were common: one granted by the feudal lord or abbot who owned the manor, and the other by the sovereign. The barons and abbots demanded tolls for the privilege; the royal charters often permitted towns to hold a market untrammelled by fees imposed by the local lord. The granting of a royal charter, indeed, was often used as a means of punishing a baron who offended the sovereign.

The existence of charters for specific trades further complicates the story. Butter markets, cattle markets, horse markets, and meat markets, each separately sanctioned and held on different days, gave additional opportunities for tolls. Some market towns still have more than one market-place. Spalding has three; Hornsea still has two market crosses, one in Southgate and the other now in the parish churchyard. King's Lynn has a Saturday Market Square and a Tuesday Market Square—though the duplication in



this instance arose because at one period the township extended into two feudal domains.

The various market crosses are relics of the time when bargains were made binding—not by written agreements—but by ratifying them in a more religious way. Hence the fact that some of these structures to-day still carry a cross. The comparatively modern and ornate example at Kirkby Lonsdale, Westmorland, is surmounted by such a symbol.

The development of the market cross into a covered market hall can be traced by observing some medieval specimens. Chipping Campden's open-sided market house is a well-known example, and the timbered one at Ledbury, Herefordshire, provides a further instance. Less widely known is a stone-built market hall, complete with its ancient cross, at Bingley, Airedale. It formerly stood in the main street of the township,

but has been removed and re-erected for preservation in one of the local parks.

The old market houses often served as administration centres, too, and sometimes incorporated a lock-up for the reception of those nefarious or unwitting traders who violated the market laws. How strict those regulations were, and how closely some of them resembled modern wartime laws, is not generally realized.

Trading by itinerant vendors was prohibited. So was buying and selling before the time stipulated for the opening of the market. At Helmsley, North Yorkshire, the market is still officially opened by a bellman, as in olden days, though the ominous-looking halberd previously carried by the bailiff nowadays remains in the nearby church.

The market traders of the Middle Ages even had a scheme of controlled prices, and undercutting or overcharging was an offence. Courts where such offenders were tried were usually held in the market house, and special laws and penalties were prescribed. The courts and the penalties imposed were entirely separate from the general courts and

national laws. Among the market laws laid down in the thirteenth century was one which debarred the establishing of a new market within six miles of an existing one.

Festival days, when fairs took place, brought a general suspension of the market laws, however. At such times, the market was thrown open to all traders, and was not restricted to those sanctioned by the authorities.

To-day, the market crosses and market halls in many of England's small country towns are the chief evidence of the one-time importance of these townships. Their trade has declined, but the souvenirs in the market square stand as mute witnesses to an illustrious past.

Dunster's picturesque market cross is a reminder that this nowadays quiet Somersetshire village was once a thriving textile centre, and that traders gathered under the wide eaves to sell their wares. Kilham, North Yorkshire, now a languid village, was at one time a chartered market town.

One of the most curious market crosses is to be seen at Richmond, Yorkshire. An un-

Helmsley market cross, North Yorkshire, where the bailiff still opens the proceedings by ringing a bell, as in olden days.

Photos by author



lovely, thick, tapering pillar, it replaced an earlier one in the eighteenth century. Far more attractive is the slender example in the extensive market square at Masham, Wensleydale. Oddly, it is chiefly in the midland and southern counties that covered market crosses are to be found. The hardy traders of the north rarely demanded such protection from the elements.

Not all such crosses in Britain were provided by public enterprise. Shepton Mallet, in the Mendips, is among the places with a specimen given to the town, nearly 450 years ago, by two local benefactors. The Knights Hospitallers were responsible for the erection of the market cross at Quainton, Buckinghamshire.

Curiosities of various kinds give further historic interest to some market-places. Thirsk, Yorkshire, still has its regular market, and though bull-baiting no longer provides entertainment for market-goers, the outline of the old bull-ring is marked with coloured stones in the paved market-place. Topcliffe, Swaledale, has a market house containing a table upon which, it is believed, the Scottish army received its "blood

money" for handing over Charles I. It is from this incident that the Topcliffe has been called "the market for kings".

Britain's country markets in past centuries exerted influences in directions which are often overlooked even by historians. The development of these trading centres, for instance, encouraged the construction of roads for transport purposes.

Skipton, Airedale, owes the establishing of its market partly to the monks of Bolton Abbey, in Wharfedale. They improved the roads leading to the town and established the routes along which, in later times, corn was carried to Skipton market from outlying areas.

Those same roads in the late eighteenth century, when the Forest of Knaresborough was turned into agricultural land, provided routes for the transport of Nidderdale corn to Skipton. In consequence, landowners in Higher Airedale turned to pasture farming, and only under exceptional conditions (such as wartime necessity) is corn nowadays grown to any considerable extent around Skipton.

Singularly enough, more modern road developments have helped to preserve and develop Skipton market and the markets of some other country towns, while causing rival markets to lapse. No longer is it necessary for a large number of markets to exist. Modern transport and good roads have brought about amalgamations. Settle, in Ribblesdale, was formerly famous for its leather market, but that enterprise ceased when distances were annihilated.

The same story has been repeated in connection with many other market towns, and it is good to know that a number of old market houses and market crosses are now being carefully preserved so that some tangible links with the romantic days of the English country market shall remain. Several of these structures are scheduled as Ancient Monuments. The National Trust authorities have also shown an interest in them. The market house at Winster, Derbyshire, was purchased by the National Trust for preservation as far back as 1906.

Perhaps the finest and most remarkable crosses in an English market-place to-day, these well-carved specimens stand at Sandbach, Staffordshire.

British Council photo



EDITOR'S NOTE-BOOK

Stanley R. Frost is a well-known Canadian engineer, a past-president of the Association of Professional Engineers of Ontario, and member of the Engineering Institute of Canada and the Canadian Society of Scientific Agriculturists. For many years Mr. Frost has been engaged in the chemical industry, and latterly has been on loan to the Department of Munitions and Supply, Controller of Chemicals, Montreal. He is also a consultant for Canada on the Committee on Fertilizers of the Combined Food Board, Washington, D.C.

* * *

Wing Commander H. T. I. Lee, M.C., a native of Parry Sound, Ontario, has been on active service for over nine years during World Wars I and II, enlisting in the R.C.A.F. in May, 1940. Before his appointment, in August, 1943, as a member of the Dependents' Allowance Board, W/C Lee served three years as Senior Auxiliary Services Officer (Air), in the course of which he made numerous inspection trips, visiting Navy, Army and Air Force units from Alaska to Labrador and overseas.

* * *

Squadron Leader Basil Dean was born and educated in England. After graduating from the University of London course in journalism, he served as a reporter on the *London Daily Herald* for two years, and later in Canada with the *Hamilton Spectator* and the *Edmonton Journal*. Commissioned in the R.C.A.F. as a Public Relations Officer in October, 1941, S/L Dean subsequently served two and a half years at Overseas Headquarters, and later with the Western and North West Air Commands, Canada. In July, 1945, he retired to join the London (England) Bureau of the Southam Newspapers of Canada. (See also C. G. J. for December, 1942.)

* * *

Arthur Gaunt—See C. G. J. for January and May, 1944, and January, February and August, 1945.

AMONGST THE NEW BOOKS

An Introduction to Electronics by RALPH G. HUDSON

(Published by Macmillan, Canada, 97 + x pages, illustrated, Price \$4.00)

SO MUCH has been written recently about the applications of electronics that it is rather startling to encounter a book which deals primarily with the basic science of electronics. The author's purpose is to familiarize the layman with the essential principles underlying the myriad of electronic gadgets which exist to-day. As he points out, electronics is achieving recognition as an amazingly useful tool in a wide variety of fields. When the accumulation of wartime development becomes generally applied, our existence will become so tied up with electronic devices that it behooves us all to know the difference between an amplifier and a photocell.

The book is not a textbook but rather a brief, pleasant bit of general reading for the man who wishes only a nodding acquaintance with the subject. It requires no more technical background than a dim recollection of high school physics and perhaps chemistry.

The book begins by sketching the modern concepts of the structure of matter. The picture is highly simplified, but it is sufficient to introduce the electron and other elementary constituents of matter, whose properties comprise the science of electronics. Having thus placed his subject, the author goes on to discuss the more important electrical phenomena.

In one chapter he deals with the flow of electricity through solids, liquids and gases, wherein for example he explains why some materials are good conductors and some are good insulators. In another he describes the mechanism and function of the various types of radio tubes, and the associated systems used for radio communication. Other chapters deal with lighting and modern sources of artificial light; the properties of alternating and direct current, and methods of converting from one to the other; photo-tubes and their application to motion-picture sound reproduction.

The remainder of the book is devoted to fitting into the picture such special applications as television, the electron microscope, radio-sonde, the radio compass and radar.

Professor Hudson does not dramatize his subject in the manner customary in popular science writing. He writes "straight", with scarcely a paradoxical statement in the whole book—probably considering that this is the best way to be both accurate and concise. If there is a fault in the book, it is that, in covering this wide field in ninety-odd pages, the author has in some places been brief at the expense of lucidity. In spite of a few hurdles which may require a second try, however, the general reader will find the book well worth the two or three evenings required to read it.

Reference should be made to the excellent photographs with which the book is well illustrated.

T. D. Northwood

The Discovery of Canada by LAWRENCE J. BURPEE
(The Macmillan Company of Canada, Toronto....\$3.00)

HISTORICALLY speaking, Canada now seems to be approaching an age of maturity in which her histories are no longer dull and lifeless catalogues of facts. The present school of historians is clothing the dry bones of dates and events with a living tissue of skilfully-wrought narrative which leads the reader through the pageant of Canadian history with pleasure and profit and recreates for him the long procession of soldiers, statesmen, traders and explorers who have, in the last three and one-half centuries, well and truly laid the foundations of our commonwealth *a mari usque ad mare*.

No one but Dr. Burpee could have written *The Discovery of Canada*. His life-long study of Canadian explorers has made his subject so familiar to him that he writes of them as one might quote the experiences of long-familiar friends. Wherever possible, he lets them tell their own story, and he weaves these quotations so skilfully into the narrative that the reader will scarcely realize where narrative stops and quotation begins. These abstracts are so well chosen that each one seems to crystallize in a few paragraphs the whole story of an expedition. The reader cannot escape the impression that the book is what might be called a labour of love in which the author, with rare discrimination and sure touch, selects from the great mass of source material, the significant events and personalities and combines them into the story of the exploration of Canada from the Atlantic Seaboard to the shores of the Pacific, the Arctic Ocean and up through the northern islands toward the Pole.

Dr. Burpee is one of those historians who can, happily, dispense with footnotes and neatly condense biographical details into a brief, alphabetically arranged, series of sketches at the back of the book. There, also, will be found a most comprehensive bibliography (in which those books readily available to the reader are marked with an asterisk) and an index. Excellent end maps amplify the text.

One typographical error was noted on page 169 where, in quoting Mackenzie's record on the rock beside the Pacific, the date given was 1723. This, of course, should be 1793.

In his preface, Dr. Burpee speaks feelingly of the sorrows of the Canadian school boy of his generation in the study of the history of his own land, and of the sad academic drivel that was called Canadian History. The school boy of to-day and of the future, as well as the adult reader, thanks to Dr. Burpee, Professor Creighton, Dr. Brown, and others of the modern school of historians, can absorb his history in a form that reads as easily as any romance and gives him, with balance and perspective, a lucid and factual account of the events and personalities that have built the Canada of to-day.

* * *

Native Peoples of the Pacific World
by FELIX M. KESSING

(The Macmillan Company of Canada, Toronto...\$4.00)

THE AUTHOR of this book, Professor Kessing, who occupies the chair of anthropology at Stanford University, was born in the East, and both he and his family have a long association with the Pacific Islands, which he has selected as his particular field of study. In writing this book, he has attempted to provide for the benefit of the soldier serving in the East and the post-war traveller a broad picture of the races and tribes inhabiting those vast islands and archipelagos stretching from Hawaii to the Malay Peninsula. It

would be impossible in the scope of any single book to give a detailed account of each tribe or sect in a population estimated at perhaps one hundred million and ranging from the ancient and complex civilization of Java and the Philippines to primitive negritos and jungle pygmies. Professor Kessing has attempted to outline the principal racial and cultural groups and describe their religion and economic life, their customs and social institutions. Naturally, it would be impossible to cover in detail a subject of such complexity, with customs and taboos differing on every atoll and in every mountain valley. Enough, however, is given to indicate to the visitor the necessity for respecting native ways which are frequently so absurd in western eyes. Professor Kessing's attitude is one of understanding and regard for local habits and institutions which usually were developed to meet the actual conditions of native life and which, in many cases, are better suited to such conditions than any superimposed westernized code. In fact, the keynote of the book is a plea for tolerance and understanding of these varied peoples, in the hope that, in adjusting themselves to contacts with the West, they may be able to preserve and develop the best features of their own age-old cultures. It is pleasing to learn, after the decimation of native populations following their first, and, in many cases, unhappy, associations with Europeans and European diseases, from which they had no hereditary immunity, that many island races are again increasing, and there is a marked tendency in colonial administration to respect and make use of tribal organization in government. These islands will be of increasing importance to the air-borne commerce of the future, and their native inhabitants must of necessity be prepared for a closer contact with a world from which they have lived so long apart.

A good book, well written, pleasantly illustrated, and expressing a viewpoint that carries no hint of western superiority but rather a wise and sympathetic concern for the future of the brown man in his relations with the white.

P.E.P.

* * *

Hitch-Hiking the Alaska Highway by GERTUDE BASKINE

(The Macmillan Company of Canada, Toronto....\$3.25)

A BRIGHTLY written book about the author's experiences on a trip along the Alaska Highway in 1943. The Highway was then in the throes of construction, and Mrs. Baskine is reputed to be the first woman to travel its entire length. It is indicated that she has diplomatic talents of no mean order, since the acquisition of a pass to travel the Highway at that time was an achievement in itself. For very obvious reasons the authorities were not inclined to encourage miscellaneous junketing.

Mrs. Baskine found the trip, for the most part, by no means difficult. She was passed along from car to jeep to truck, with uncanny speed, and, as a rule, accommodation of some sort could be obtained at construction camps along the road where the arrival of an unescorted female was cause for a minor sensation. Her story gives due space to the incidents of travel, the day-by-day concern for bed and board, and the difficulties of a lone woman in a man's world. Various camps and people she met are described at some length and, on occasion, with considerable insight, but there is surprisingly little about the country, and, in fact, one may surmise that she could see but little of it through the cloud of dust that hung perpetually over the traffic bouncing up and down the half-completed road.

Everywhere she was treated with kindness and courtesy, and hard-driven construction officials were

at pains to speed her on her way. The only exception was an Indian who was engaged to guide her along an unopened thirty miles of the road. His native pride was abated by the duty of piloting a member of the inferior sex, and he treated her with a studied hauteur that indicated his opinion of women in the wilds. This thirty miles, which was covered in a day and a half, was the only part of the whole journey not made by motor, although some of the trucks in which she hitch-hiked were harder to ride than the wise old cayuse that bore her so carefully over bog and through muskeg.

Whitehorse and Fairbanks, booming under the pressure of wartime construction; sleepy Dawson, living in its memories of '98; Juneau and Skagway; river-boats and trading posts all contribute to Mrs. Baskine's picture of the North, but, once away from the Highway, the reader will have some difficulty in following her route or connecting her rather disconnected sketches.

* * *

Canadian Re-Establishment Benefits for Veterans

by ROBERT ENGLAND

(The Macmillan Company of Canada, Toronto.....25c)

A SUPPLEMENT to *Discharged* by the same author which was reviewed in these columns some months ago. It summarizes recent legislation with regard to gratuities and the re-establishment of the soldier in civil life.

* * *

The Arts and Crafts of Canada

by D. G. W. McRAE

(The Macmillan Company of Canada, Toronto....\$2.50)

A BOOK of illustrations of representative examples of Canadian arts and crafts, with brief explanatory essays. It includes French-Canadian and British-Canadian architecture, contemporary architecture, painting, sculpture and crafts. Mr. McRae has evidently had in mind the selection of examples of sound design and craftsmanship, and one of the chief pleasures in the study of a book of this description is the encouragement it gives toward the selection by the reader of examples to his own taste in the various classes. Few, however, will have the background and fine discrimination which Mr. McRae brings to a subject which is, at once, his work and his avocation.

The reproductions are excellent and the design and make-up of the book are such as to be in themselves a pleasure to the book-minded.

P.E.P.

* * *

New Found World by KATHERINE B. SHIPPEN

(The Macmillan Company of Canada, Toronto. \$4.50)

ACCORDING to the slipcover, Miss Shippen was moved to write this book by the need of an account of Latin America for children and adolescents. This reviewer, being somewhat removed in years from these classes, cannot venture to express an opinion as to its suitability for the young but found it to be, for himself, one of the most readable and entertaining books that has come to his hands in many months.

This book is not history and not geography but a *mélange* of the two, pleasantly flavoured by the obvious interest of the writer in her subject. Commencing with an account of Latin America before the coming of the white man—the great empires of the Aztecs and the Incas, the wandering tribes of forest Indians gliding through the haunted shadows of the jungle, and the

(Continued on page XII)

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(Continued from page XI)

hunting tribes of the pampas, vigorous and warlike, Miss Shippen continues her story through the bloody and glorious days of the conquest of the great native empires and the era of colonization of the sixteenth century. Then comes the period of the viceroys when the representative of the King of Spain lived in regal state, governing in the King's name and collecting his revenue from California to the Straits of Magellan. The American and French Revolutions awoke throughout the Americas a desire for freedom which was achieved only after a series of bloody wars lasting through a generation or more. Brazil, more fortunate than her Spanish neighbours, achieved a bloodless revolution that made the King's viceroy, and son, the first president of the new republic.

Miss Shippen is fortunate in having for her subject one of the most interesting parts of the world, with its gorgeous tropical setting, its records of ancient empires, of treasures unbelievable, of war and conquests, of great cruelties and the splendour of the faith and valour of simple men.

The book is handsomely illustrated with woodcuts in the modern style and has two excellent maps. There is an index, a list of references and a short bibliography.

P.E.P.

Two Solitudes by HUGH MACLENNAN
(Collins, \$3.00)

Two Solitudes is a most encouraging book—one that should give heart to that large body of Canadians who so long have sought in vain for signs of the advent of a truly national literature. E. K. Brown, in the first chapter of his admirable little book, *On Canadian Poetry*, has stated:—"One of the forces that can help a civilization to come of age is the presentation of its surfaces and depths in works of imagination in such a fashion that the reader says: 'I now understand myself and my milieu with a fullness and a clearness greater than before'." He points out, furthermore, that: "A great art is fostered by artists and audience possessing in common a passionate and peculiar interest in the kind of life that exists in the country where they live."

In Hugh MacLennan we have an author who has succeeded in interpreting to us our great national problem (the age-old antagonism between French and English Canada) with such skill, sympathy and insight as we have not witnessed before; and the many thousand copies of his book already bought, read and eagerly discussed in Canada (and the United States) would seem to indicate that reader response has been adequate—and thoughtful. Too skilful in execution, too significant in theme to deteriorate to the ranks of a mere ephemeral best-seller, this novel, in spite of minor technical flaws and a certain unevenness, is undoubtedly on the right track at last.

It may well be charged by those who fail to take all the factors into consideration that *Two Solitudes* is more regional than national in character. True—the scene is laid in Quebec, and the very substance and spirit of

both Montreal and Saint-Marc-des-Érables are set forth with such truth of detail and tone as renders them palpable and alive for the reader; we are, indeed, completely immersed in them—made to walk their streets and know their buildings by a master whose descriptive skill approaches Arnold Bennett's. But the theme of the novel transcends its scene of action. A schism which rends and threatens the social, political and cultural life of the whole Dominion provides, obviously, a problem of national import, and should be viewed with deep interest and concern by all Canadians from coast to coast.

To MacLennan's particular credit is the fact that he manages to view the old and bitter struggle with complete tolerance and impartiality—not by attempting to sidestep the issue or minimize in any way the savage hatreds and insidious threats to national unity (even survival) involved, but rather by admitting boldly the evils and grievances on both sides, and showing their origins and the provocation responsible for giving rise to and perpetuating their destructive force.

Built primarily around a problem, the book might easily have sunk to the level of a tiresome ranting polemic; but not for a moment was it permitted to do so. This is a consistently stirring and artistic novel (covering the period 1917-1939)—and, as such, it similarly avoids another danger which has frequently proved a pitfall to inexperienced authors. Of necessity, MacLennan's characters were created as symbols of the various conflicting elements involved in the great racial and religious struggle portrayed—but they triumphantly absorb and transcend that level, and each proves, in his own right, a convincing and fascinating individual.

There is Athanase Tallard—a French-Canadian aristocrat who tried to break the bonds of his people's isolationism, and failed; Marius Tallard, his elder son, is a radical and passionate political champion of his own people, with an undying and absorbing hatred of all things English; Paul Tallard, Marius' step-brother, in whom, as son of a French father and Irish mother, are fused the ideals and unrest of both races, feels akin to neither, and becomes enveloped in a great loneliness; there is, too, charming Daphne Methuen—also a stranger to her own family, in revolt against the cold snobbishness of her aggressively pro-British mother—whose solitude finally, though not without bitter opposition, seeks out, merges with, and so dissipates that of Paul. Too numerous to mention here are many other striking characters, including John Yardley, a retired "bluenose" sea captain, and Huntley McQueen, the brilliantly portrayed and completely unscrupulous Ontario-born industrialist.

Finally, it should be stated that Mr. MacLennan does not attempt to solve the central problem. But that is not the function of the novelist. His success lies, rather, in setting it boldly, completely and, above all, sympathetically before us—so forcefully that our imagination is stirred, our understanding awakened, and our collective determination aroused to strive, with friendly tolerance, for a final and lasting unity based on mutual respect and goodwill.

K. C.

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China After Seven Years of War

edited by HOLLINGTON K. TONG

(Macmillan Company of Canada, Toronto, \$2.50)

TWELVE articles, for the most part by Chinese writers, on China and the Chinese after seven years of war and invasion. The best of these deals with the life of the average man in China, the incredible inflation, the scarcity of food and goods of all description, and the hard struggle for the barest elements of existence. Other sections, which are not without some flavour of propaganda, deal with the Chinese Government, student life, the new attitude toward women in work and affairs, and American co-operation in training Chinese soldiers and airmen.

An interesting book which, however, leaves the reader with the feeling that it tells only a small part of the story.

* * *

Lookin' Eastward by CAPTAIN THOMAS H. CLARE

(Macmillan Company of Canada, Toronto, \$3.25)

CAPTAIN Thomas H. Clare, whose name appears on the title page of this book, served in India as a Chaplain attached to an American bomber group. He was reported missing on operations more than a year ago. Material he had sent home has been prepared for publication by his widow, in the form of a series of sketches of the life and outlook of the American soldier in India.

Captain Clare commences with his embarkation from an American port and takes the reader through the long monotony of the voyage, broken by sundry submarine and raider alarms, to Karachi and the first vision of the allegedly gorgeous East. From Karachi a long trek across the sub-continent to the Burma border brings the squadron to an operational base and serves as an initiation to India and the ways of the Indian. Life at the base and the strange customs of an ancient and alien land form a background for the exploits of individual members of the squadron who consistently conform to a pattern of unconformity which leads to some very interesting situations. These, at times, strain the descriptive powers of even the most liberal-minded of Chaplains, but Captain Clare apparently belonged to that school of padres who take their army as they find it, and he tells his story with few reservations.

This is a brisk and lively book, easily read, and, in general, most enjoyable. Your reviewer confesses to a dislike to having the British referred to as "Limeys" and Indians as "Wogs", though probably that is the way in which they are referred to. There seems to be a convention in books about the American soldier that requires him to be drawn as a hard and uncouth roughneck, bristling and pugnacious to allies and enemies alike, and measuring all places and all peoples with his own provincial yardstick. Actually, it is hard to believe that he differs so radically from our own men at arms, and for all the bluster, he is more probably, for the most part, a simple, valiant man, lonesome perhaps and bewildered in a strange environment, but firmly

determined to make a good end to the deadly job in which is engaged. His repute is tarnished by a school of writers who seem to think that a man must be tough to be brave.

P.E.P.

* * *

Russia and the Peace by SIR BERNARD PARES

(Macmillans, Toronto, Ont., \$3.25)

TO WESTERN peoples Russia's attitude continues to be the great enigma of the peace. Her incorporation of the Baltic States into the Union of Soviet Republic, her attitude with respect to the Polish frontier and Polish Government, together with a certain intransigence in evidence in communistic groups in Greece and Yugoslavia, have given some cause for a revival of those feelings that practically barred Russia from intercourse with other nations for much of the inter-war period. It also appears that Russia, at times, views the policies of her allies with equal suspicion. No book can foretell what the end product of these differences will be, but, in the present volume, Sir Bernard Pares gives a sympathetic and understanding study of Russian aspirations which will provide the reader with some knowledge of her policies and of the tangled question of Central European frontiers. It is his view that the Russia of to-day is not interested in the spread of communism abroad but, rather, is fully occupied with the development of her own vast resources and the welfare of her own people. Her hope is for a secure frontier and to include within it those Europeans of Russian race who were in pre-war Poland and the Baltic States. The dispute on the Polish Russian Boundary is no development of recent years but reaches far back into a past in which, for centuries, these areas were a bloody no man's land. Actually, Sir Bernard states, the population north of the so-called Curzon line is some 80 per cent Russian peasants working the great estates of their Polish overlords, and however successful Poland may have been in governing her own nationals, these orthodox Russians had little cause to love or respect the late Polish Government. Under these circumstances, Russia, who liberated Poland, seems extremely likely to call the tune as to the new Poland that will arise after the war.

Russian relations with the Balkans, Turkey, and, in Asia, where she comes into contact with the British Empire, China and Japan are adequately covered, but it is evident that the author is primarily concerned with the European phases of his subject. Throughout the book much the same conclusions are reached as those expressed in another book *What Russia Wants* which was reviewed in the December issue of the Journal.

Sir Bernard Pares has spent much time in Russia during the past forty years as an official of the British Foreign Office and as a guest and traveller. He has taught Russian history in the Universities of Liverpool and London and lectured extensively on Russian subjects in Canada and the United States. His attitude towards Russia is perhaps best exemplified by his reference to many good friends who perished during the revolution and of whom he now thinks in the same

way that he remembers other friends who were killed in the war. He concludes his book with the plea for a fair and considerate understanding of Russia, without which the world will inevitably stagger into a third and even more terrible war which will wreck, for all time, the civilization of the west.

A fine and very timely book.

* * *

The Pacific Islands Handbook, 1944,

by R. W. ROBSON, F.R.G.S.

(Macmillan Company, North American Edition, \$5.00)

SINCE 1932 successive editions of this book have been published in Australia, where interest in the Pacific Islands is both economic and strategic. The present demand in America for information about the Islands, coupled with a paper shortage in Australia, has made an American edition necessary.

Living on the other side of the world, it is hard to realize the number and magnitude of the islands of the East. The names of many of them are vaguely familiar, and there are many eminently readable books of travel describing their enticements, handsomely illustrated with pictures of natives of commanding physique, and sun-warmed beauties who have been, by no means, the least of the attractions of these fortunate islands since the first white man saw their palm-fringed shores rise above the arc of the horizon. These are the South Sea Islands of the romantic novel, of Conrad, Somerset Maugham, Nordhoff and Hall, and a host of others who picture for us their mountains, their coral atolls and blue lagoons, friendly or unfriendly natives and gin-drinking traders. Such books, however, do not, as a rule, provide very much of the meat and sinew of geography, economics and population. Mr. Robson gives these meaty facts in most readable form and, strangely enough, manages to preserve, in the midst of statistics of population, brown, yellow, and white, and tables of imports and exports, more than a little of the romance of these distant lands and their dusky inhabitants.

Re-reading the last paragraph, your reviewer feels that he may have let his own interest in blue lagoons and flower-decked natives carry him somewhat beyond the severely factual account of the Pacific Islands which he, supposedly, is reviewing. The reader, however, may well suspect that Mr. Robson himself is an addict of the islands which, in contrast to the reviewer, he probably has seen. Be that as it may, he has combined history, geography, economics, ethnology, and a very human interest into an illuminating description of the islands, including an up to 1944 account of the war and its effects. As this is written, the Japanese invasion seems to be in full ebb, to the benefit, we may hope, both of the natives and of the great trading nations, who have gathered, one by one, these jewels of the sea in their respective spheres of influence.

A useful and timely book, carefully prepared, with good maps and an index. Interesting to the general reader and valuable as a reference.

—P.E.P.



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